New Hampshire Rivers Management and Protection Program

River Nomination Form

Instructions: Before beginning any work on a river nomination, Sponsors should contact the State Rivers Coordinator at the NH Department of Environmental Services (DES). The Rivers Coordinator can provide initial guidance by identifying local and regional contacts and other sources of information and can give advice throughout the preparation of a river nomination. Refer to the publication, "A Guide to River Nominations," for a step-by-step explanation of the nomination process and a directory of federal, state, regional, and private sources of information and technical assistance. The River Coordinator's address and telephone number are: DES Rivers Coordinator, P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095, (603) 271-8801.

I. NOMINATION INFORMATION

1. Name of River: Ammonoosuc River

2. River/River Segment Location (and start/end points) and Length (miles):

Starting from the confluence with the Connecticut River upstream to the WMNF property line at Lower Falls, a distance of 49.6 miles through the towns of Haverhill, Bath, Landaff, Lisbon, Littleton, Bethlehem, and Carroll. See Map 1 and Section V.

3. (a) Sponsoring Organization or Individual:

Ammonoosuc Corridor Advisory Committee &Town of Littleton

(b) Contact Person:

Raymond Lobdell
88 Gale Chandler Road
Landaff, NH 03585
Telephone: 603-838-6880
Fax: 603-838-6636
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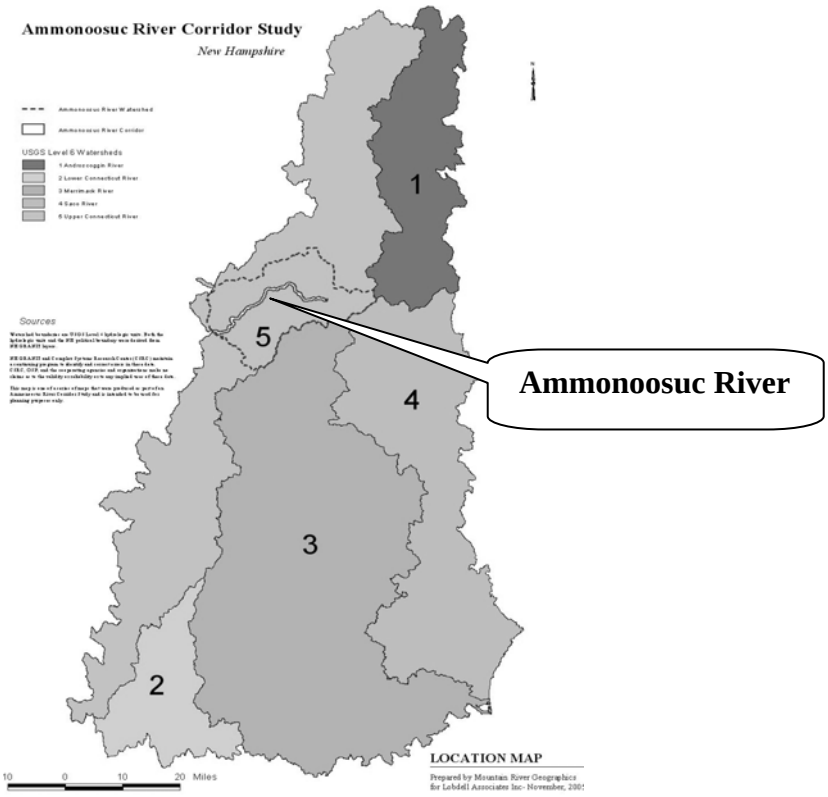
II. SUMMARY: RESOURCES OF STATEWIDE OR LOCAL SIGNIFICANCE

Explanation: In order to be eligible for designation to the NH Rivers Management and Protection Program, a river must contain or represent either a significant statewide or local example of a natural, managed, cultural, or recreational resource.

Instructions:

1. By checking the appropriate boxes below, indicate the resource values that you believe are present in the nominated river and its corridor and whether you believe these values are present at a level of significance that is statewide or local. If the value is not present, leave the box blank.

	Value Present/ Statewide Significance	Value Present/ Local Significance
Natural Resources		
Geologic or Hydrologic Resources	X	
Wildlife Resources	X	
Vegetation/Natural Communities	X	
Fish Resources	X	
Rare Species or Habitat	X	
Water Quality		X
Open Space	X	
Natural Flow Characteristics		X
Managed Resources		
Impoundments	X	
Water Withdrawals/Discharges		X
Hydroelectric Resources	X	
Cultural Resources		
Historical/Archaeological Resources	X	
Community River Resources		X
Recreational Resources		
Fishery Resources	X	
Boating Resources	X	
Other Recreational Resources	X	
Public Access	X	
Other Resources		
Scenic Resources	X	
Land Use		X
Land Use Controls		X
Water Quantity		X
Riparian/Flowage Rights		
Scientific Resources		



2. **Briefly describe the most important resource values which are present in the nominated river and why you believe these values are significant from either a statewide or local perspective. For example, if the river contains a segment of whitewater that attracts kayakers from throughout the state and is identified in a regional boaters' guide as a premier whitewater kayaking and canoeing segment, you should identify recreational kayaking and canoeing as a significant statewide resource and include one or two sentences in support of this statement. In addition, if you feel that a resource value is threatened, explain why.**

Cultural: The Ammonoosuc River offers many historic and cultural resources of local and statewide importance representing all of the important historical periods, from the early settlers to the rise of tourism in the 20th century. The river corridor has 8 known archeological sites (prehistoric and historic), 7 structures on the National Historic Register, 6 historic bridges, 15 historic sites, and many additional identified locally important resources. Each of the 5 historic villages along the river are different and reflect a variety of historic periods, from the colonial Upper Bath Village to downtown Littleton with its 19th century water powered factories built right on the river's banks, to Bethlehem and Carroll's old hotels catering to early 20th century tourists. Several historic markers identify sites including a site used by Rogers Rangers during the French and Indian Wars, an 18th century coal kiln which can still be seen and was used by colonist in the making of local pig iron, the ruins of Willowdale Village which burned and was never rebuilt, and Woodsville, a railroad junction with over 30 passenger trains a day at its peak.

The four villages along the river-Woodsville, Bath, Lisbon, and Littleton-are making efforts to preserve and enhance their unique historic past by restoring covered bridges, railroad stations, and mill buildings.

Beauty: The Ammonoosuc River is one of the most beautiful and significant river valleys in NH. It is valued by locals and tourists from around the country for its spectacular vistas of the Presidential Range of the White Mountains in its upper portion and its picturesque agricultural setting along the lower valley. The river's steep, mountainous features provide rapids and falls with Lower Falls in the White Mountain National Forest of particular beauty. Major portions of the corridor along Route 302 have been designated as either state or national Cultural and Scenic Byways.

Water Supply and Quality: The Ammonoosuc directly and indirectly provides drinking water to the communities through which it passes. Woodsville Precinct gets its drinking water directly from the river and the town of Lisbon obtains its drinking water from gravel packed wells located right on the river's edge. Numerous individual wells lie along the entire length of the river. Over 50% of the river's corridor has been identified as aquifer which can be found along its entire length from Woodsville to Carroll.

The water quality of the river has improved dramatically since the 1970's with nearly the entire river meeting or exceeding Class B standards. However, concerns about the lack of water quality data have resulted in volunteers recently involving the river in the NHDES Volunteer Water Quality Monitoring Program.

Managed Resources: The Ammonoosuc supports four existing hydropower facilities located at historic dams along the river in Woodsville, Bath, Lisbon, and Littleton.

Recreation: The Ammonoosuc offers recreational opportunities of importance to both the state of New Hampshire and New England as a whole. Its northern section flows through the White Mountain National Forest with its associated hiking, camping and other activities. The B&M railroad bed lying adjacent to the river is now part of the state owned trail system from Woodsville to Littleton. Littleton, as part of its Main Street Program, has developed the river walk trail system, including a new covered walking bridge in downtown. Woodsville is currently developing a park at the confluence of the Ammonoosuc and Connecticut Rivers.

The river itself is one of the state's best white water rivers with rapids rated from Class II to IV and is enjoyed by an increasing number of kayakers and canoeists. The easily accessible river is heavily fished for native and stocked trout and it is not unusual on a hot summer day to see people, residents and tourists alike, swimming at many locations along the river.

Wildlife/Aquatic: The wildlife and aquatic resources within the corridor's 25 square miles and 50 miles of stream channel are significant. With two thirds of the corridor forested, 8% in agricultural, and 4% wetlands, the corridor offers a wide diversity of habitat.

The NH Natural Heritage Inventory has identified over 30 exemplary plant communities and nearly 40 endangered or threatened species in the Ammonoosuc corridor. Over 100 bird species have been identified with bald eagles, osprey, and variety of hawks seen in the spring and fall as they migrate along the river.

The US Silvio O. Conte National Wildlife Refuge identifies the Ammonoosuc River as "an important cold water fishery" and places a 'high' priority on protecting the river, not only as an important fishery, but also for "contiguous habitat communities" which include portions of the White Mountain National Forest.

Threatened Resources: The Ammonoosuc River Valley is currently in the middle of a development boom with increases in commercial and residential users and a population growth exceeding projections. There is growing concern about the impact these changes and the resulting fragmentation will have on water quality, wildlife, stream bank erosion rates, access, and the quality of the recreational experience on the river.

III. COMMUNITY AND PUBLIC SUPPORT

Explanation: The level of community and other public support which is demonstrated for a river nomination will be an important factor in determining whether that river will be recommended for legislative designation. Such support may be shown by the adoption of a town resolution, a letter from selectmen, master plan excerpts, or documented support from other groups, either public or private (if private, explain the group's purpose and who is represented).

Instructions: Describe the type of community and other public support which exists for the river nomination and attach appropriate documentation. Include copies of any letters of support from local elected and appointed officials.

In the fall of 2003, the Town of Littleton applied for and received a grant from the Upper Connecticut River Mitigation and Enhancement Fund to conduct an assessment of the river corridor. The project, called The Ammonoosuc River Corridor Assessment and Enhancement Project, was designed to determine local concerns about the river and address these concerns on a corridor wide basis rather than piecemeal attempts on only a town-wide or short river segment basis. In the early spring of 2004, the Littleton Selectmen sent a letter to each of the other 6 Boards of Selectmen in the towns that abut the river and asked if they would appoint a person to serve on the Ammonoosuc River Corridor Advisory Committee. Additionally, 3 members were selected representing each of 3 interest groups along the river: recreation, development, and agriculture. This committee of 10 was formed in the spring of 2004 and their first meeting was held on April 22, 2004. They continue to meet. Workshops have been held on stream bank erosion and buffers which were attended by local officials and landowners.

In the summer of 2005, with financial assistance from the Connecticut River Joint Commission Partnership Program and technical assistance from NHDES and the Grafton County Cooperative

Extension Service, a volunteer water quality monitoring program was begun on the river. Its first report is included with this nomination.

In the fall of 2004, the committee completed a report on the river corridor, which included a detailed inventory and mapping of natural and cultural resources, and discussed issues and recommendations for action. One of those actions was to seek designation of the river.

As part of that nomination process, fact sheets and other information were sent to planning boards, selectmen, and conservation commissions in each town, as well precincts, chamber of commerces, Main Street programs, recreational users, interested groups, etc. News releases were sent to local newspapers as well as paid announcements. In February 2006, 5 public meetings were held in the towns along the corridor at which power point presentations were made on the nomination process and on the river's value.

In the entire two years of undertaking this nomination process, we have encountered no one and no group that have been against this nomination.

Letters of public support have been mailed directly to NHDES by the supporters.

IV. OTHER SUPPORTING INFORMATION

Explanation: In addition to the information provided on this nomination form, Sponsors are encouraged to submit any other information which they believe will support the nomination of the river. This information may include a visual presentation (for example, a slide program or a map showing the location of significant resources) or studies and reports on the river.

Instructions: List what, if any, additional supporting information has been submitted with this river nomination.

- Ammonoosuc River Corridor Study – Phase I Report / October 2004
- Q & A pamphlet on Ammonoosuc River Designation
- Volunteer Water Quality Monitoring Report-2006
- The Dells WQ Study Report
- Ammonoosuc Valley Mitigation Banking Feasibility Study, 2001

V. RIVER CLASSIFICATIONS

Explanation: Each river or river segment that is designated by the state legislature will be placed into a river classification system. This classification system consists of four categories: Natural, Rural, Rural-Community and Community Rivers. Refer to Appendices A and B in the Guide to River Nominations, for a complete description and explanation of the river classification system and the instream protection measures which have been adopted by the state legislature for each classification. In this part of the

nomination form, DES and the State Rivers Management Advisory Committee are interested in learning which river classification(s) you believe is most appropriate for your river.

Instructions:

1. For each classification criteria listed below (a-d), check the one box which most accurately describes the nominated river or segment.

The following tables and Map 1 detail our river segments proposed for designation.

Proposed Ammonoosuc River Designations by Location

From	To	Segment Length (miles)	Water Quality Classification	Distance to Nearest Road (minimum)	Designation	Description
Junc. Conn. River (Haverhill)	Burton Brook (Bath)	1.1	B	75’	Community	Woodsville Village; hydro dam; roads, public water supply, mixed land uses
Burton Brook	Simonds Brook (Bath)	3.9	B	75’	Rural/Community	Mixed land uses; agricultural, residential, Route 302 adjacent
Simonds Brook	0.9 miles above covered bridge (Bath)	1.5	B	100’	Community	Bath Village; hydro dam; historic covered bridge/village; agriculture
0.9 miles above covered bridge (Bath)	Lisbon/Landaff/Bath Town Line	5.3	B	100’	Rural/Community	Mixed uses, agricultural, residential, roads adjacent
Lisbon/Landaff Town Line	Pearl Lake Brook (Lisbon)	2.8	B	75’	Community	Lisbon Village; hydro dam; industrial uses, high density residential; roads adjacent
Pearl Lake Brook	Lisbon/Littleton Town Line	8.3	B	100’	Rural/Community	Mixed uses, agricultural, commercial, residential, Route 302 adjacent
Lisbon/Littleton Town Line	Littleton/Bethlehem Town Line	7.7	B*	100’	Community	Littleton Village, high density commercial and industrial development; hydro dam
Littleton/Bethlehem Town Line	WMNF Boundary near Lower Falls (Carroll)	20.4	B	75’	Rural	Forested, WMNF, residential uses, roads adjacent in some locations; Carroll Village, recreational users
	Total	**49.6**	-			

*small segment in Littleton impaired due to bacteria counts. See water quality discussion.

Proposed Ammonoosuc River Designations by Town

	Natural	Rural	Rural/Community	Community

Haverhill	0	0	0	0.2
Bath	0	0	8.4	2.4
Landaff/Lisbon	0	0	0	1.1
Lisbon	0	0	8.1	1.7
Littleton	0	0	0	7.3
Bethlehem	0	13.7	0	0
Carroll	0	6.7	0	0

VI. Maps

A map of the river must be appended to this resource assessment. This map should be taken from a U.S. Geological Survey quadrangle (scale 1:24,000) or equivalent in accuracy and detail. GIS maps produced to show river-related resources can serve this purpose. Include an inset or locator map showing the location of the river or segment within the state.

Seven GIS maps have been included with this nomination, which are based on information available through the GRANIT system:

Map Number	Name	Topics
1	Ammonoosuc Watershed	Proposed River Designations, Ammonoosuc Watershed, Corridor, Towns
2	Natural Resources	Agricultural soils, Aquifers, Steep Slopes
3	Managed Water Resources	Dams, Reservoirs, Public Water Supplies, USGS Stations
4	Wildlife	Unfragmented Lands, Osprey Sitings, Aquatic Habitat, Deer yards
5	Land Cover	Agricultural, Developed, Forested lands
6	Open Lands	Conservation Lands, White Mountain National Forest
7	Cultural Resources	Recreation Facilities, Campgrounds, River Access, Historic Sites, Historic Villages, Trails, Canoeing

VII. RESOURCE ASSESSMENT

1. Natural Resources

(a) Geologic Resources

Briefly describe the significant geologic resources of the river and its corridor, including any unique or visually interesting features such as waterfalls, unusual rock formations, and areas of rapids. If you are unable to include such features, then simply describe the bedrock geology map. Consider geologic resources on the basis of natural history, visual, and economic interest. Indicate if the state geologist or a national or state resource assessment has identified these geologic resources as significant at a national, regional (New England), state, or local level.

Bedrock Geology

In 1997, an updated bedrock geology map was prepared for New Hampshire through a collaboration of professors from Dartmouth College, Harvard University, the University of New Hampshire, and geologists from the U.S. Geological Survey. The map shows the Ammonoosuc River to be located in the middle of complex bedrock formations of igneous and metamorphic rocks including granite and granodiorite. The newer igneous rocks range from 150 million years old to 500 million and formed the White Mountains and the upper end of the corridor. The metamorphic rocks are mostly schists and were formed approximately 400 million years ago and lie at the lower end of the corridor in Bath and Haverhill.

There are some earth-mineral resources present in the bedrock due to its geologic history. Some of those resources include quartz, muscovite, biotite, garnet, calcite, magnetite, pyrite, tremolite, hornblende, malacitie, and mica. At this time, none of them are economically valuable or abundant enough to be mined.

Anomalous occurrences of gold in New Hampshire were well documented by the middle 1800s. Gold in the Ammonoosuc District is found in veins with sulfide minerals such as pyrite, as "free" gold in quartz veins, and dispersed in sheared chloritic schist or chromiferous, carbonate rock. Streams draining into the Connecticut River, especially from the confluence of the Ammonoosuc River at Woodsville north to the Connecticut Lakes, are all favorable for finding gold in placer deposits. Other areas reporting finding gold within the Ammonoosuc River are Salmon Hole Brook and Ammonoosuc River below Bath. Recreational gold dredging regularly occurs in the corridor.

In the report, “The Geology of New Hampshire” by T. Meyers and G. Stewart (1977), several old mines are noted in the Littleton/Lisbon area. They were mostly copper mines but little copper was found. Several iron mines were also located within the watershed.

The steep mountainous back-drop of the river corridor offers spectacular scenic beauty, enhanced by the display of various rock outcrops, slopes, and cliffs cutting through the many layers of glacial material as the river travels towards the Connecticut River. These geologic features contribute to the rugged unusual beauty of the corridor, offering many deep pools, white water rapids, and sparkling water falls. In the report “NH River Protection and Energy

Development Project Report" (NE Rivers Center), the Ammonoosuc River was identified as having geologic/natural features of "high significance".

Amount the geological resources:

- Confluence with the Connecticut River- The high ledges and rock pools are dramatic, especially during peak flows. In the French and Indian War, Roger's Rangers used this as a rendezvous point due to the unique and easily identifiable ledges.

- Bath "gorge"- The River quickens as it flows through this narrow valley with its steep bedrock walls.

- Salmon Hole- In Lisbon, bedrock outcrops force a dramatic change in river direction and create deep holes in which Native Americans used to fish for trout and salmon.

- Rock Pool- Upstream a few hundred feet on the Gale River before it flows into the Ammonoosuc, large, deep, bedrock pools have been formed, which are favorite swimming holes.

- Littleton water falls which offers swimming and great small town and river views from bridges and a river walking trail.

- Lower Falls- In Carroll, these falls, created on bedrock ledges, are dramatic and popular with locals and tourists alike.

Surficial Geology

Surficial geology is concerned with those materials above bedrock. The surface layer of weathered material, soil, is not included in the study of surficial geology. Surficial deposits are unconsolidated, loose conglomerations of rock fragments.

The Ammonoosuc River lies within the Connecticut River Valley watershed and was once part of the great Glacial Lake Hitchcock. The Connecticut River Valley is internationally renowned as a glacial geology research site for the examination of sediment deposition that occurred in Glacial Lake Hitchcock as the ice sheet receded. Lake Hitchcock occupied much of the Connecticut River Valley during deglaciation and probably early postglacial time. In the corridor, the lake extended up the Ammonoosuc River valley to Littleton.

Groundwater Resources

Surficial deposits in the corridor are glacial in origin. There have been several periods of glaciations with the most recent period ending ten to twelve thousand years ago. As the glaciers advanced, the bedrock was scraped and gouged, and the moving ice carried the eroded material. This advance did not drastically alter the topography of the area; the profile of the mountains and hills appears much as it did before the glacial advance. However, the glacier did have a great impact on the appearance of the valleys. As the climate warmed and the ice retreated, it deposited two major types of material—till and glacial outwash deposits.

Till is composed of a mixture of soil and rock fragments that were scoured loose by the moving ice, carried for a distance, and then deposited. It is generally highly compacted and contains many large angular stones and boulders.

Glacial melt waters caused outwash deposits. They are the stratified sand and gravel deposits and are extensive in the corridor. Outwash deposits are important economically for mining purposes, but they also serve as major groundwater-recharge areas.

In 1996, the US Geological Survey published a detailed study of aquifers for this region. The report is entitled, "Geohydrology and Water Quality of Stratified Drift Aquifers in the Middle Connecticut River Basin," Report #94-4181(10). Aquifers extend along the Ammonoosuc River almost continuously from Woodsville to Carroll. Each of the aquifers has been identified and numbered in the USGS report with all or portions of aquifers 7, 16, 10, 17, 18, and 19 being located in the corridor. Over 10,000 acres or nearly 2/3rds of the corridor is within aquifer areas. Only Bethlehem has less than ½ its corridor area in aquifer with Landaff, Lisbon, Haverhill, and Bath having more than 3/4ths. Map 3 shows the locations of all aquifers in the corridor. The Town of Lisbon and many businesses and residences within the corridor depend on these aquifers for individual water supplies.

Two corridor areas are within Drinking Water Protection Areas. One is within the Woodsville Precinct's supply, which is the Ammonoosuc River. The other is the Town of Lisbon's supply which is gravel packed wells adjacent to the river.

(b) Wildlife Resources

New Hampshire is home to more than 500 species of vertebrate animals as well as hundreds of invertebrates (insects, crustaceans, clams and snails). About 75 percent are nongame wildlife species not hunted, fished or trapped. Twenty-one species are endangered and thirteen are threatened in the state. The abundant diversity of wildlife habitats within the Ammonoosuc River watershed are home to a rich population of fish and wildlife species. Wetlands, which make up only about 4% of the total land area in the corridor, are important habitat areas that offer important wildlife benefits not only to water fowl, but to a variety of species that use wetlands for nesting, breeding, or food.

(1) List the species of mammals and birds commonly found in the river and river corridor.

Beaver, mink, weasel, muskrat, and otter are often seen in the river, while white tail deer, moose, and black bear can be seen crossing it. Sections of the river in Carroll are prime viewing areas for moose. In the corridor these and other mammals are found including woodchucks, chipmunks, squirrels, mice, moles, rats, raccoons, foxes, skunks, rabbits, bats, fishers, coyotes, and bobcats. Large sections of unfragmented lands (Map 4) found in the corridor are especially important for black bear and bobcat.

A list of the bird species identified in the corridor by town is shown below, as gathered by the NH Audubon Society of NH. It lists over 100 species. Some of these species, such as the Bald Eagle, Osprey, and hawks can be seen in the spring and fall as they migrate to and from their breeding grounds.

Audubon Bird Sightings Along the Ammonoosuc River
1995-2004

Bird Species	**Towns Reported**
Canada Goose	Bath, Littleton, Lisbon
Wood Duck	Littleton, Bath, Landaff, Lisbon, Haverhill
American Wigeon	Landaff
American Black Duck	Bath
Mallard	Bath, Haverhill
Ring Necked Duck	Lisbon
Hooded Merganser	Bath
Wooded Merganser	Lisbon, Littleton, Bath
Commom Merganser	Littleton, Haverhill, Bath, Lisbon
Wild Turkey	Haverhill, Bath, Lisbon, Landaff
American Bittern	Lisbon, Littleton
Green Heron	Lisbon, Littleton
Black Crowned Night-Heron	Littleton
Turkey Vulture	Littleton, Carroll, Lisbon, Haverhill
Osprey (threatened)	Lisbon, Bath
Sharp-shinned Hawk	Lisbon, Littleton
Bald Eagle (endangered)	Lisbon
Northern Goshawk	Lisbon
Northern Harrier	Haverhill
Red-shouldered Hawk	Bath, Littleton, Lisbon
Red-tailed Hawk	Lisbon, Bath
American Kestrel	Carroll, Bath
Sora	Lisbon
Merlin	Littleton
Peregrin Falcon (endangered)	Lisbon, Haverhill
Bird Species	**Towns Reported**
Killdeer	Lisbon, Bath, Littleton
Solitary Sandpiper	Littleton
Spotted Sandpiper	Littleton
Sanderling	Bath
Least Sandpiper	Littleton
Wilson’s snipe	Landaff

American woodcock	Littleton
Herring Gull	Lisbon
Iceland Gull	Lisbon
Glaucous Gull	Lisbon
Great Black-backed Gull	Lisbon
Morning Dove	Littleton
Black-billed Cuckoo	Littleton, Lisbon
Barred Owl	Lisbon, Bath
Common Nighthawk	Lisbon
Whip-poor-will	Carroll
Chimney Swift	Littleton
Ruby-throated Hummingbird	Littleton, Carroll, Haverhill
Belted Kingfisher	Bath, Carroll
Yellow-bellied Sapsucker	Littleton
Black-backed woodpecker	Carroll
Northern Flicker	Bath
Pileated Woodpecker	Bath, Lisbon
Olive-sided Flycatcher	Lisbon
Alder Flycatcher	Lisbon
Willow Flycatcher	Lisbon
Eastern Phoebe	Bath
Eastern Kingbird	Lisbon, Bath
Northern Shrike	Carroll, Littleton
Yellow-throated Vireo	Bath,
Blue-headed Vireo	Lisbon
Warbling Vireo	Littleton
Red-eyed Vireo	Littleton
Blue Jay	Bath
American Crow	Bath, Littleton, Lisbon
Common Raven	Lisbon, Carroll,
Tree Swallow	Littleton, Lisbon
Northern Roughwinged Swallow	Bath
Bank Swallow	Lisbon, Bath
Barn Swallow	Lisbon, Littleton, Bath
Caroline Wren	Haverhill
Marsh Wren	Lisbon
Ruby-throated Kinglet	Littleton
Eastern Bluebird	Bath
American Robin	Bath, Lisbon, Littleton, Carroll
Cedar Waxwing	Carroll
Nashville Warbler	Haverhill
Northern Parula	Littleton
Yellow Warbler	Lisbon
Yellow-rumped Warbler	Littleton
Bird Species	**Towns Reported**
Pine Warbler	Landaff, Littleton
Bay-breasted Warbler	Carroll
Louisiana Waterthrush	Carroll
Mourning Warbler	Bath, Landaff*
Common Yellowthroat	Bath
Scarlet Tanager	Landaff
American Tree Sparrow	Bath

Chipping Sparrow	Littleton, Bath
Field Sparrow	Littleton
Savannah Sparrow	Landaff
Fox Sparrow	Littleton
Song Sparrow	Littleton, Bath
Swamp Sparrow	Lisbon
Dark-eyed Junco	Littleton
Snow Bunting	Littleton
Indigo Bunting	Bath
Bobolink	Lisbon
Red-winged Blackbird	Littleton
Blackbird sp	Lisbon
Pine Grosbeak	Haverhill, Bath, Carroll
House Finch	Littleton
Red Crossbill	Carroll, Lisbon, Bath
White-winged Crossbill	Carroll
Common Redpoll	Bath, Littleton
Hoary Redpoll	Littleton
Evening Grosbeak	Littleton, Bath

(2) List any endangered or threatened animals which are supported by the river and river corridor environment. Include location, if known. Check whether these animals are endangered [E] or threatened [T] species and if they are significant at a national [N] or state [S] level.

Animal Species	Location	E or T	N or S
Osprey	Lisbon & Bath	T	S
Bald Eagle	Lisbon & Littleton	E	N
Peregrine Falcon	Lisbon & Haverhill	E	S
Brook Floater (mollusk)	Bethlehem	T	S
Upland Sandpiper	Haverhill	E	S

(3) List significant wildlife habitat which is supported by the river or to which the river is integral, for game and non-game wildlife populations. Identify if the habitat has been determined to be exceptionally diverse, very diverse, or moderately diverse by the NH Fish and Game Department or the U.S. Fish and Wildlife Service.

Significant Habitat **Diversity Rating**

While the NH Fish & Game Department has no diversity rating system for the corridor, the Ammonoosuc offers very diverse habitats.

Mammals, such as beaver, mink, muskrat, otter, moose, deer, and black bears, spotted within the corridor, are attracted to these areas because of their abundant food and cover. These areas also support a rich variety of amphibians, reptiles, invertebrates and fish, important in maintaining regional biodiversity.

Much of the corridor is forested and much of the forest is evergreen which has potential for deer yards, as shown on Map 4.

Wetlands along the corridor, along with the stream channel itself, provide important and unique habitats for a large number of species including birds, amphibians, and reptiles. They provide diversity and are product wildlife habitats.

Floodplains provide important habitat and travel corridors for wildlife. They serve as stopover points where long distance migratory wildlife can find food, water, and shelter. Like wetlands, these are highly productive ecosystems. The large floodplains along the lower portion of the river, much of which is in cropland, offer abundant food for mammals and birds including wild turkeys, moose, and deer.

The riparian areas also provide habitat for wildlife that is equally as important as the wetlands. The upland edge provides nesting habitat for songbirds and numerous waterfowl.

The following table from NH Fish & Game shows reptiles and amphibians found in New Hampshire, both residents and visitors. The habitats of the Ammonoosuc corridor are favorable for these species, but no inventory has been done.

REPTILES	***AMPHIBIANS***
Racer	Bullfrog
Snake, Brown	Frog, Green
Snake, Common Garter	Frog, Mink
Snake, Eastern Hognose	Frog, Northern Leopard
Snake, Eastern Ribbon	Frog, Pickerel
Snake, Milk	Frog, Wood
Snake, Northern Water	Mudpuppy
Snake, Redbelly	Newt, Eastern
Snake, Ringneck	Peeper, Spring
Snake, Smooth Green	Salamander, Blue-Spotted
Turtle, Blanding's	Salamander, Four-toed
Turtle, Common Musk (Stinkpot)	Salamander, Jefferson
Turtle, Eastern Box	Salamander, Marbled
Turtle, Painted	Salamander, Dusky
Turtle, Snapping	Salamander, Spring
Turtle, Spotted	Salamander, Two-lined
Turtle, Wood	Salamander, Redback
	Salamander, Slimy
	Salamander, Spotted
	Toad, American
	Toad, Fowler's
	Treefrog, Gray

(4) Determine if the river corridor is important for the movement of wildlife between large habitat areas. If it is, explain why.

Travel corridors are also vital to wildlife because animals must travel over varying distances to find food and mates, protection from predators, to alleviate competition, and to scatter their populations. They play a major role in maintaining healthy populations, avoiding interbreeding and localized over-population. By enabling animals to move from one habitat to another, travel corridors reduce the effect of habitat fragmentation, which occurs as a result of various human activities. Protecting this existing resource of undisturbed corridors between large areas of breeding and travel habitats are foremost to healthy wildlife populations. NH Fish and Game have identified deer yards/wintering areas, within the Ammonoosuc corridor in the towns of Bath, Lisbon, Landaff and Littleton. However, recent activities such as logging and development may have caused deer yards to disappear or to be abandoned. Map 4 identifies coniferous forest areas which offer potential dear yard suitability. However, any deer yard information is dated since logging can eliminate them.

The river corridor is important for the movement of wildlife both up and down the corridor and to large habitat areas within the watershed. These areas include vast tracts of forestland, both privately owned and within the thousands of acres of the White Mountain National Forest. While there is development in the corridor, there are significant areas of unfragmented lands all along the Ammonoosuc River, as can be seen on Map 4. These large undeveloped areas of land provide important areas for movement of wildlife up and down the corridor, as well as allowing wildlife to reach the river itself. Without undeveloped lands along the corridor, including agricultural land, idle agricultural land, and forest land, wildlife within the upper portions of the watershed would have difficultly reaching the river.

Additionally, the wetland within the corridor offers a specific habitat that provides a transitional area between the river itself and wetland/stream/lake habitats farther up in the watershed. Without these, the necessary movement of some species would be limited.

(c) Vegetation/Natural Communities

(1) List the plant species commonly found in the river and river corridor.

The species present along the Ammonoosuc are the result of climate, elevation, hydrology, soils, and human impacts. The entire corridor is within the humid temperate ecosystem but the corridor is within two separate ecological subunits along its length, according to the US Geological Survey. The lower section is in the New Hampshire Upland subsection and the northern (upper) portion in the White Mountain subsection. While most species are found in both sections, the White Mountains area is dominated by large areas of spruce-fir forests and northern hardwood forests while the lower portion of the corridor is a transitional area of confererous and hardwoods forests. For example, coniferous forests in Bath may consist primarily of white pine while those in Carroll may be balsam fir and red spruce. Hardwoods in the northern section may have a predominance of yellow birch while in the lower end the northern extent of red oak can be seen in Landaff and Bath. Wetland plant communities in both sections are dominated by Palustrine forested communities.

Literally hundreds of plant species may be found in the corridor. Representative species include: balsam fir, white spruce, red spruce, black spruce, arbor vitae, white pine, eastern hemlock,

tamarack, red oak, red maple, sugar maple, yellow birch, beech, moosewood, white birch, aspens, shadbush, beech, ash, poplar, white cedar, along with alder, willows, dogwoods, elderberry, winterberry, blueberry, cherry, and large and varied number of herbaceous weed, grass, and wildflowers.

Wetlands, including river and stream banks, provide a unique habitat that is suitable for hundreds of species of sedges, rushes, grasses, ferns, and woody species. Wetlands offer a diversity of species not found elsewhere in the corridor.

(2) List any endangered or threatened plant species that are supported by the river and river corridor environment. Include location, if known. Check whether these plants are endangered [E] or threatened [T] species and if they are significant at a national [N] or state [S] level.

The known endangered or threatened plant species in the corridor (from the NH Heritage Natural Heritage Inventory) are extensive and are listed below:

Plant Species	Location	E or T	N or S
Bailey's Sedge	Littleton	T	S
Bebb's Sedge	Littleton, Haverhill	T	S
Ciliated Aster	Littleton, Bethlehem	T	S
Ciliated Willow-herb	Littleton, Bethlehem, Bath	T	S
Garber's Sedge	Littleton	E	S
Golden-fruited Sedge	Littleton, Landaff	T	S
Grass-of-Parnassus	Littleton	T	S
Pursh's Goldenrod	Littleton	T	S
Three-leaved Black Snakeroot	Littleton	T	S
Chestnut Sedge	Lisbon	E	S
Green Adders-mouth	Landaff, Beth, Carroll	T	S
Large Yellow Lady's –slipper	Landaff	T	S
Bosc's Pigweed	Haverhill	E	S
Green Dragon	Haverhill	E	S
Hackberry	Haverhill	T	S
Kalm's Brome-grass	Haverhill	E	S
Kalm's Lobelia	Haverhill, Bath	T	S
Prickly Rose	Haverhill	E	S
Goldie's Fern	Bethlehem	T	S
Hidden Sedge	Bethlehem	E	S
Jack Pine	Bethlehem	T	S
Kidney-leaved Violet	Bethlehem, Carroll	T	S
Heart-leaved Twayblade	Carroll	T	S
Hidden Sedge	Carroll	E	S
Plant Species	**Location**	**E or T**	**N or S**
Lily-leaved Twayblade	Carroll	T	S
Meadow Horsetail	Carroll	T	S
Millett-grass	Carroll	T	S
Thin-leaved Alpine Pondweed	Carroll	T	S
Wapato	Carroll	T	S
White Bluegrass	Carroll	T	S
Climbing Fumitory	Bath	T	S
Dwarf Ragwort	Bath	T	S
Great St John's-wort	Bath	T	S

Gregarious Black snakeroot	Bath		T		S		
Hairy Rock-cress	Bath		E		S		
Houghton's Umbrella-sedge	Bath		T		S		
Incurved Umbrella-sedge	Bath		T		S		
Loesel's Twayblade		Bath	T			S	
Siberian Chives	Bath		T		S		

(3) List any vegetative communities supported by the river and the river corridor environment which have been identified as "exemplary natural ecological communities" by the New Hampshire Natural Heritage Inventory. Include location, if known.

Many exemplary ecological communities exist in the corridor, most related to special forested or forested wetland environments.

Exemplary Natural Ecological Community	**Location**
Rich mesic forest –	Littleton.Landaff
Northern white cedar – balsam fir swamp –	Littleton, Bath
Rich slopping fern system -	Littleton
Hemlock-spruce-northern hardwood forest –	Landaff, Bath
Black spruce – larch swamp –	Landaff, Bethlehem
Herbaceous riverbank/floodplain –	Landaff
High-gradient rocky riverbank system –	Landaff, Bath
Red maple – black ash – swamp saxifrage swamp –	Landaff
Red spruce swamp –	Landaff
Red pine rocky ridge –	Haverhill
Rich sugar maple – oak – hickory terrace forest –	Haverhill
Acidic riverbank outcrop –	Haverhill, Bath
Silver maple – wood nettle – ostrich fern floodplain forest –	Haverhill
Lowland spruce – fir forest -	Bethlehem
Montane acidic cliff –	Bethlehem
Montane lichen talus barren –	Bethlehem
Red spruce – heath – cinquefoil rocky ridge -	Bethlehem
Spruce – birch – mountain maple wooded talus-	Bethlehem
Sugar maple – beech – yellow birch forest –	Bethlehem
Medium level fen system –	Bethlehem
Montane heath woodland –	Bethlehem
Montane sloping fen system –	Bethlehem
Northern hardwood – black ash – conifer swamp –	Bethlehem
Northern medium sedge meadow marsh –	Bethlehem
Poor level fen/bog system –	Bethlehem
Red spruce swamp –	Bethlehem
Exemplary Natural Ecological Community	**Location**
Moderate-gradient sandy-cobbly riverbank system	Carroll
Sugar Maple – ironwood – short husk floodplain forest	Carroll
Sugar maple/ false nettle – sensitive fern floodplain	Bath

(d) Fish Resources

(1) List the fish species commonly found in the river.

The Ammonoosuc has a healthy variety of fish species. However, NH Fish & Game has little detailed information. Electrofishing data is limited.

Fish species identified in the Ammonoosuc River & tributaries include: Atlantic salmon, brown trout, blacknose dace, common white sucker, brook trout, fallfish longnose dace, longnose sucker, slimy sculpin, creek chub, common shiner, spottail shiner, tessellated darter, and rainbow trout.

(2) List any endangered or threatened fish species which inhabit the river. Check whether these fish are endangered [E] or threatened [T] species and if they are significant at a national [N] or state [S] level.

There are no naturally occurring endangered or threatened fish species in the Ammonoosuc River. Atlantic salmon (endangered nationally) are present due to the federal and NH Fish & Game stocking program.

(3) Describe the presence and location of spawning beds, feeding areas, and other significant aquatic habitat for fish populations. Determine if the habitat is exceptionally diverse, very diverse or moderately diverse as determined by the NH Fish and Game Department or the U.S. Fish and Wildlife Service.

The NH Fish & Game Department does not have any detailed information relative to aquatic habitat diversity ratings. Data collected in 1997 and 1999 concerning aquatic habitat are shown below.

Summary of Habitat Information- Stream Surveys, 1999

Town	Sta #	% Pool	% Riffle	% Glide	% Boulder	% Rubble	% Gravel	% Sand	% Mud	% Wooded	% Shrubs	% Pasture	% Other
Lisbon	6	5	8	88	15	60	20	5	0	80	20	0	0
Lisbon	7	56	31	13	70	15	13	1	1	80	20	0	0
Carroll	24	20	36	44	53	40	5	2	0	80	20	0	0
Carroll	25	18	8	74	10	45	15	30	0	0	80	0	20
Carroll	26	19	34	47	45	30	15	10	0	70	30	0	0
Carroll	55	7	54	39	70	20	5	5	0	40	60	0	0

Source; NH Fish & Game

Physiochemical Information

Town/Year	**Sta #**	**Avg. Width**	**Avg. Depth**	**Discharge**	**Max. Temp**	**Min. Temp**	**DO**	**pH**	**Alkalinity**	**Conductivity**
Units	**-**	**Meters**	**Cm**	**m3/s**	**F**	**F**	**mg/l**	**Units**	**Mg/l**	**uMhos/cm**
Lisbon/99	6	6.5	10	0.12	-	-	9	6.9	22.5	158

Lisbon/99	7	6.5	11	0.11	-	-	10	6.6	7.5	173
Carroll/97	53	10.4	26	1.3	59	47	10.2	6.1	5	12
Carroll/97	54	29.1	34	5.7	-	-	9.3	6.4	5	25
Carroll/97	55	21.5	46	5.93	76	51	10.6	6.3	6	29
Carroll/97	28	6.2	26	0.14	64	44	9.8	6.3	6	60

Source: NH Farm &Game

In the Silvio O. Conte National Fish and Wildlife Refuge Final Action Plan and Environmental Impact Statement, US Fish & Wildlife valued the Ammonoosuc River as "an important cold water fishery." According to NH Fish & Game Region 1 biologists, the lower portion of the river below Littleton offers the most important habitat with other important areas above Littleton. Shallow water on ledge makes the section of the river in Littleton less significant. Critical habitat found includes deep pools, such as Salmon Hole in Lisbon and the ledges in Bath, which provide cool water refuge necessary for summer survival of coldwater species.

In the report "NH River Protection and Energy Development Project Report" (NE Rivers Center), the Ammonoosuc River was evaluated as an inland fishery and was identified as "a most outstanding river" and was rated "high" for six of seven criteria considered: species composition, water quality aquatic habitat, fishing quality, aesthetic experience, and current use.

According to local a Trout Unlimited member, the aquatic habitat for coldwater fish populations is highest for the lower portion of the Ammonoosuc offering variables such as good spawning substrate, a sufficient temperature regime, and some notable depths.

(4) Indicate whether the significant fisheries found in the river rely on natural reproduction or a stocking program. If fish populations rely on a stocking program, indicate whether they are partly or wholly dependent on the program.

While natural trout reproduction is present, principle fisheries in the river rely on a regular stocking program as natural reproduction could not meet the level that would sustain the angling pressure. The NH Fish & Game stocks the Ammonoosuc River every year with rainbow, brook and brown trout. Fish stocking occurs primarily from mid-March to early July. There are several reasons for this, the foremost is related to water temperatures. Since trout cannot tolerate water temperatures when they warm to the mid-70s, they need to be stocked prior to the onset of this occurrence. According to NH Fish & Game, fish stocking is undertaken for 3 reasons: 1) to create or enhance angling opportunities 2) as part of a restoration effort (example Atlantic salmon), and 3) to create or enhance the foraging base of a freshwater game-fish.

Table 3.3.10 summaries the stocking program for 2003. This represents only fish stocked in the Ammonoosuc River and not its tributaries.

Over 30,000 rainbow, brook, and brown trout were stocked in the main channel in 2003, as shown in the table below. This does not count the thousands of trout stocked in the tributaries nor the salmon program, as discussed below.

Fish Stocking Ammonoosuc River 2003

Dates: April thru September

Town	Species	Number	Maximum Water Temp. (F)--Date	Minimum Water Temp. (F)--Date
Woodsville	RT, EBT, BT	0	-	-
Bath	RT, EBT, BT	6,399	66--6/24	43--4/22
Landaff	RT, EBT, BT	0	-	-
Lisbon	RT, EBT, BT	3,600	65--7/16	50--5/1
Littleton	RT, EBT, BT	2,041	68--8/12	50--5/1
Bethlehem	RT, EBT, BT	6,300	69--8/12	50--5/12
Carroll	RT, EBT, BT	12,000	75--8/5	40--4/29
Total		**30,340 (9,788 pounds)**		

Source: NH F & G, 2004 (RT-rainbow trout, EBT-brook trout, BT-brown trout

(5) Is the river a viable anadromous fish resource? If yes, identify any on-going or planned restoration programs.

The river provides a viable setting for Atlantic salmon as NH Fish & Game sampling efforts have shown much success, finding fish of one, two, and three years of age.

The current restoration of Atlantic salmon to the Connecticut River watershed began in 1967. It is a major cooperative effort between the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Forest Service, the North Atlantic Salmon Conservation Organization, state fish and wildlife departments in the watershed, private organizations, and industry. While the program has had many setbacks and the number of salmon returning to date is very small, the program is continuing with hope of greater returns and ultimate restoration to much of the Connecticut River Watershed, including the Ammonoosuc.

Ammonoosuc River Salmon Stocking Program ((Number of fish stocked)

Location	1999	2000	2001	2002	2003
Upper Portion*	215,815	308,250	308,250	216,818	219,542
Lower Portion*	201,050	281,470	281,470	97,624	96624
Total	416,865	589,720	589,720	314,442	316,166

*Upper Portion- Mt. Washington Hotel to Wing Road (Bethlehem) Lower Portion- I-93 Bridge (Littleton) to Salmon Hole Bridge (Lisbon)

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(e) Water Quality

(1) Check the state's water quality classification which applies to this river or segment under state law.

☐ **Class A** X **Class B**

(2) According to readily available information, what is the actual water quality of this river under the state's water quality standards?

In February of 2004, the NH Department of Environmental Services released its most recent assessment of water quality in the river. The report, which is required by the US Environmental Protection Agency (US EPA) under the Clean Water Act (Sections 305b&d) describes the quality of the river and analyzes the extent to which the river provides for the protection of and propagation of shellfish, fish, and wildlife, allows for recreational activities in and on the water, and contains a list of waters impaired or threatened by a pollutant. Overall, the river meets Class B standards except for one section above Apthrop Dam in Littleton which had an elevated bacteria count and this listed as "threatened or impaired". According to NHDES, "there has not been enough data on almost all of the river to make a full assessment. It is unknown at this time if sections of the River meet Class A standards.

As part of the public participation component of the nomination process, volunteers have acted to have the Ammonoosuc River become a participant in the NHDES Volunteer Water Quality Monitoring program. Over $ 3,000 of testing equipment has been purchased by the Corridor Study Group and sampling begun in the summer of 2005 with the goal of continuous monitoring to provide improved water quality data for the river. The data collected includes turbidity, pH, dissolved oxygen, temperature, and conductivity. The NHDES Volunteer River Assessment Program 2005 Ammonoosuc River Water Quality Report is included with this application. Although sampling was limited in 2005, water quality met B standards except for low pHs in some upper portions of the river. Testing will resume this spring.

☐ **Class A** X **Class B**

(3) If the river is not currently supporting its water quality classification, identify the existing major causes of deficient water quality (e.g., industrial or sewage pollutants, agricultural fertilizer run-off) and possible corrective measures (e.g., regulations, enforcement, local and use controls).

As stated above, in order to increase the base line data on the water quality of the River, the Ammonoosuc River Corridor Study Action Plan includes a citizens based, volunteer monitoring project for the River. In the 2005 report, low pHs could be the result of acid rain or natural bedrock conditions. The section of the river in Littleton indicated as threatened by NHDES was based on one sampling only that showed an elevated bacteria count. The source is unknown.

(f) <u>Natural Flow Characteristics</u>

Briefly describe the natural flow characteristics of the river, including natural periodic variation in flow (e.g., spring run-off and summer flow amounts) and

frequency and duration of flood events. If applicable, describe purpose of and flow variations caused by impoundments, significant diversions, or channel alterations, including interbasin transfers. Indicate which segments of the river are free-flowing.

Stream flow varies dramatically on the Ammonoosuc due to climate, precipitation patterns, and watershed characteristics. Currently, the USGS maintains stream flow gauging stations on the Ammonoosuc River at only one location which is in Bethlehem, as shown on Map 3. Another station was operated in Bath between 1936 and 1970. One station also exists on the Connecticut River just downstream of the confluence with the Ammonoosuc. The following table is a summary of the flow data for each station.

River Flow Data Source: USGS
(cfs)

	Connecticut River	**Ammonoosuc River**	**Ammonoosuc River**
Location	Woodsville	Bath	Bethlehem
Years of Data	1939-2002	1936-1970	1939-2002
Drainage Area (sq. miles)	2,644	395	88
Annual Mean	5,017	639	207
Highest Annual Mean	7,355	1,004	323
Lowest Annual Mean	3,211	413	131
Minimum Daily Dis.	152	-	16
Highest Daily Mean	50,600	-	6,300
Maximum Peak Flow	57,100	27,900	11,300

Spring is the normal period of high river flow due to snowmelt and rainfall. As in most of New England, the runoff potential varies greatly with the season. Flooding within the corridor is affected primarily by the intensity and duration of rainfall in areas of the watershed upstream and the presence of very few storage areas (wetlands, lakes, large floodplains) where the impact of the excess runoff can be absorbed. (Based on hydrograph of the floods of 1936 and 1938, the duration of flooding is usually 1 to 4 days through this area, and the rate of floodwater rise varies from 0.2 to 1.5 feet per hour. Compare the projected 100-year peak flows for the Connecticut River at Wells River with a 2644 square mile watershed with the peak flows in the Ammonoosuc River in Bath with a 395 square mile watershed-80,300 versus 50,000 cfs. While the Connecticut has over 6 times as large a watershed at this point, the Connecticut's peak flow is only 1.6 times

greater than the Ammonoosuc's! This points out the steep, narrow, flashy nature of the Ammonoosuc's watershed.

Predicted 100-year peak and actual low flows

Location	Drainage Area (sq. miles)	Projected 100 year peak flows (cfs)	Low flow (cfs)
Conn River at Wells River	2,644	80,300	-
Bath Gauging Station	395	50,000	169
Lisbon/Bath T.L.	304	29,800	143
Littleton/Lisbon T.L.	141	18,795	-
Bethlehem/Littleton T.L.	118	16,555	143
Carroll	42	-	27

Source: USGS and FEMA flood insurance studies

Flooding on the Ammonoosuc has been caused by several types of events. A combination of rainfall and snowmelt caused the floods of March 1936 and March 1953. Intense rainfall from an extra tropical cyclone caused the flood of October 1959. Hurricane rainfall caused the floods of November 1927, September 1938, and June 1973.

Flood Hazard Maps have been prepared by FEMA for all towns through which the Ammonoosuc flows. However, the maps have not been digitized and no composite map is available at this time.

However, on the Ammonoosuc ice can be an important factor in flooding. The 100-year flood elevations are based on determining peak flows in river and then determining how much space in the floodplain that flow will need. Ice jams and dams, which occur quite frequently on the Ammonoosuc River, are not part of that equation. Because ice damming is not well understood, predicting when, where, or how high ice dams will form is not yet possible. Ice jams dramatically alter stream flows by impounding water behind them and then releasing it. Hydrologic models used to predict peak flood flows do not take into account the effects of ice dams. While ice dams can occur anywhere along the river, there are several locations where they repeatedly occur including behind impoundments at Woodsville, Bath, Apthrop, and Bethlehem dams, above Upper Bath Village, Salmon Hole and above Lisbon Village. Thus the extent and severity of flooding in the Ammonoosuc Corridor has been and will be in the future greater than the 100 year flood maps predict.

Ice Jams in the Ammonoosuc River

Town	Years
Woodsville	2003,1986,1976
Bath	1992,1976,1965,1961,1559,

	1957, 1938
Lisbon	2003,2000,1996,1993,1976,
Littleton	1999,1996, 1992
Bethlehem	1992, 1972,1962,1957,1952,1945

Source: CRRL

It is interesting to note that not only do ice jams result in higher peak flows than normal, but also extreme low flows. For example, the lowest flow recorded at the Bethlehem gauging station was 16 cfs recorded in 1952, the result of an ice jam just upstream.

Most of the river is free flowing with only small impoundments behind the Woodsville, Bath, Lisbon, and Apthrop Dams. The dams do not act as flood control structures; however, there are small impacts to flow characteristics since water is diverted for short distances at the four hydro sites. Additionally, the dam's old impoundments are shallow and contain sediment. This undoubtedly causes a slight warming of the waters in the summer months behind the dams. However, overall, the impact is minor.

(g) Open Space

Briefly describe, give the location and identify the type (e.g., floodplain, forested, etc.) and type of ownership (i.e., public or private) of significant areas of open space in the river corridor. Describe and include the location of any protected land parcels within the river corridor (e.g., state parks and forests, national forest lands, municipal parks and conservation easements).

Much of the land in the Ammonoosuc Corridor is either forest land or agricultural land, as seen on Map 5. The agricultural land is found primarily in the lower half of the river where the floodplains are wide and the soils prime. Developed land includes the villages of Woodsville, Bath, Lisbon, Littleton and Carroll. Low density residential development continues to expand throughout the watershed.

With regard to permanently protected open space with the corridor, only about 1% of the corridor's land is permanently protected. Although, the White Mountain National Forest includes thousands of acres at the upper end of the river's watershed, only a small portion of it is actually in the narrow corridor. Small areas of state and local land including town and state forests and recreation areas make up the rest of the protected areas. Map 6 shows the location of the open spaces, their owners, and size.

2. Managed Resources

(a) Impoundments

List all of the dams which are present in the river, including any dams which are breached or in ruins. Identify their location, ownership, and purpose (i.e., flood control, low flow augmentation, or storage). Also indicate whether minimum flow requirements exist at any of the impoundments, if known. Include any proposals for new or reconstructed dams; indicate that this is a proposed dam by placing and asterisk (*) next to the name of the dam. Do not include existing or proposed dams which are used for hydroelectric energy production. These will be listed separately in the managed resources category.

Fourteen dams are listed by NHDES for the Ammonoosuc River. Dam locations are shown on Map 3 and detailed in the following table. However, only 5 dams currently exist.

Eight of the dams are in ruins with most having been old stone and timber dams used for generating power for early mills. Four of the dams are currently used for low head hydroelectric production. One dam, permitted in Littleton in 1941 was never built. Two dams have a class "A" hazard rating, meaning failure could cause minor damage to property. The three rated "B" would result in the release of "wastes or pollutants" if they failed. None of the dams have sufficiently large impoundments to cause concern if they were to fail. According to NH Fish & Game, only one dam, (#025.01) in Bethlehem has been considered for removal to improve fish habitat.

	A	B	C	D	E	F	G	H	I
1	DAM	HAZCL	RIVER	TOWN	NAME	HEIGHT	IMPND	DOWNER	STATUS
2	017.02	B	AMMONOOSUC RIVER	BATH	AMMONOOSUC RIVER DAM	20	24	MR CHARLES DIAMOND	ACTIVE
3	017.03		AMMONOOSUC RIVER	BATH	AMMONOOSUC RIVER			MR ROBERT MCHUGH	RUINS
4	017.04		AMMONOOSUC RIVER	BATH	AMMONOOSUC RIVER	14		MR HAROLD GENEEN	RUINS
5	025.01	A	AMMONOOSUC RIVER	BETHLEHEM	BETHLEHEM DAM	29	5.5	MR FREDERICK KENDALL	ACTIVE
6	025.10		AMMONOOSUC RIVER	BETHLEHEM	LOWER AMMONOOSUC RIVER DAM			UNKNOWN	RUINS
7	112.03	B	AMMONOOSUC RIVER	HAVERHILL	WOODSVILLE DAM	23	27	ENEL NORTH AMERICA INC	ACTIVE
8	138.01	A	AMMONOOSUC RIVER	LISBON	LISBON DAM	24	64	WHITE MOUNTAIN HYDRO	ACTIVE
9	140.01	B	AMMONOOSUC RIVER	LITTLETON	APTHORP DAM	24	12	WHITE MOUNTAIN HYDRO CORP	ACTIVE
10	140.02		AMMONOOSUC RIVER	LITTLETON	AMMONOOSUC RIVER DAM			TOWN OF LITTLETON	RUINS
11	140.03		AMMONOOSUC RIVER	LITTLETON	AMMONOOSUC RIVER II DAM	11		PIKE MANUFACTURING CO	RUINS
12	140.04		AMMONOOSUC RIVER	LITTLETON	AMMONOOSUC RIVER III DAM	6		TOWN OF LITTLETON	RUINS
13	140.05		AMMONOOSUC RIVER	LITTLETON	AMMONOOSUC RIVER IV DAM	6		NM FARR COMPANY	RUINS
14	140.06		AMMONOOSUC RIVER	LITTLETON	AMMONOOSUC RIVER V	28		SARANAC GLOVE CO	RUINS
15	140.15		AMMONOOSUC RIVER	LITTLETON	WATER SUPPLY DAM	8		TOWN OF LITTLETON	NOT BUILT

(b) Water Withdrawals and Discharges

(1) List any significant water withdrawals from the river, including withdrawals for public drinking water, industry, and agriculture. Identify the purpose (e.g., irrigation) and location of the withdrawal. Indicate if the river has been identified in a state, regional, or local study as a potential source of water supply and, if so, identify the study.

According to the NHDES, there are 4 facilities that withdraw water directly from the river and they are listed below.

Woodsville Precinct is the only municipal water system that draws its drinking water directly from the river. The Town of Lisbon has gravel packed wells that lie directly adjacent to the river and are impacted by river flows. Other towns and precincts obtain their water from within the watershed, often high up in the watershed within the White Mountain National Forest. They rely on trapping water behind weirs on small streams and piping the water to storage systems below. Public water supplies are shown on Map 3.

Pine Tree Power, a biomass electric generation facility, withdraws water used in its processing of the wood chips for the production of electricity.

The hydro sites along on the river also withdraw water, but that water is put directly back into the river.

No recent study has identified the river as a future water supply source, but this may only be a matter of time. Growth and development may make the low volume supplies higher up in the watershed inadequate for some towns.

Water Withdrawals

Name	Purpose	Location
Bath Electric Power Co	Hydro	On River-Bath
Pinetree Power Co	Power Plant	On River-Bethlehem
Woodsville Water & Light	Water Supply	On River-Woodsville
CHI Operations	Hydropower	On River-Woodsville

(2) List all known surface water and potential discharges to the river and identify the source, type (e.g., industrial wastewater) and location of the discharge. Indicate whether the discharge has been permitted by the state (yes or no).

There are 3 NPDES permits issued in the corridor. All of these permits are for municipal sewage treatment plant outfalls. (Woodsville's treatment plant discharges into the Connecticut River. Currently there are no permitted groundwater discharges within the corridor.

Point Source Discharge	Type	Location	Permit?
Bethlehem	WWTF	On River	Yes
Littleton	WWTF	On River	Yes
Lisbon	WWTF	On River	Yes

(c) Hydroelectric Resources

List all known existing or potential (as cited in the NH River Protection and Energy Development Project -- Final Report; New England Rivers Center, 1983) sites of hydroelectric power production. Record the owner, location and whether the site is regulated or exempt from regulation by the Federal Energy Regulatory Commission (FERC).

According to the above report, the entire Ammonoosuc River is identified as possessing the one of the state's highest natural and recreational resource values, one of 24 river segments on 16 rivers so identified. In the above report, four dams are listed as being potential hydropower sites: Woodsville (#112.03), Bath (#017.02), Lisbon (#138.01), and Bethlehem (#25).

Currently, there are 4 active hydro facilities on the Ammonoosuc, all of which were constructed at pre-existing dam sites along the river. The Bethlehem dam is not used for any purpose and exempt from FERC regulation.

Existing Ammonoosuc River Hydro Operations

Town	Dam #	FERC Reg.	Status	Use	Type	Year Const.	Ht (ft)	Length (ft)	Impound (acres)	Perm Storage (acft)	Drainage Area (sq.mi)	Haz Class	Owner
Hav	112.03	Yes	Active	Hyd	Concrete	1936	23	297	27	179	402	B	Enel NoAmerica
Bath	017.02	Yes	Active	Hyd	Concrete	1900	20	273	24	100	-	B	Charles Diamond
Lisb	138.01	Yes	Active	Hyd	Concrete	1926	24	300	64	96	288	A	White Mt. Hydro
Lit	140.01	Yes	Active	Hyd	Concrete	1936	24	300	12	86	230	B	White Mt. Hydro

3. Cultural Resources

(a) Historical and Archaeological Resources

Describe any significant historical or archaeological resources or sites with significant potential for such resources (as determined by the state historic preservation officer) found in the river or river corridor. Identify whether the resource is listed or is eligible to be listed as a National Historic Landmark (NHL) or on the National Register of Historic Places (NRHP) or is a recognized Historic District (HD) or Multiple Use Area (MUA). If known, indicate whether these resources are significant at a national, regional (New England), state, or local

level. Below this listing, note any local town histories, oral histories, or general historical knowledge about the use of the river and its corridor.

History of the River

The Ammonoosuc River corridor has played a major role in the history of the area. Before the first white settlers, the Abenaki Indians fished and camped along the river, netting fish in the narrow river bends, such as Salmon Hole. Ammonoosuc is an Abenaki word for 'fish place,' a very appropriate designation even today. The famous French and Indian war fighters, Rogers Rangers, stopped at the mouth of the Ammonoosuc on their way back from the destruction of St. Francis, Quebec in 1759 before proceeding downstream to the Connecticut.

The first European settlers to the valley found their way via the Connecticut River in the mid 18th century. Frontiersman and settlers made their way up the river from its confluence with the Connecticut and also came overland to the Littleton area from 15 Mile Falls on the Connecticut River. The first hunters began moving up the valley around 1750 and charters for many of the towns were granted by the King in the 1760's. In 1775, an official census of Lisbon listed 47 persons. The early economy was based on farming and lumbering and industries were developed to support them. In the late 1700's, dams were built on the Ammonoosuc in Bath, Lisbon, and Littleton to power gristmills, sawmills, and shingle mills. Later starch mills, tanneries, smelting mills, bobbin mills, and peg mills were constructed, all relying on water power either on the Ammonoosuc or its larger tributaries.

The population continued to grow. In 1853, the White Mountain Railroad, a branch of the Boston, Concord, and Montreal Railroad, was constructed, running from Woodsville to Littleton. The 20.6 mile track followed the Ammonoosuc, crossing twice in Bath. The railroad had a dramatic impact on the economy of the area, allowing, for the first time, produce, raw materials and manufactured goods to be shipped to distant markets. Woodsville became a thriving railroad hub with large roundhouses and train maintenance facilities. The railroad caused an increase in the variety and types of mills along the river, including shoe and boot factories, piano parts, leather board, and bobbin/peg mills with ties to the textile industry in southern New England. Subsistence agriculture was replaced by commercial farming with a variety of produce being shipped south. The railroad also changed growth patterns and population migration. Woodsville became the economic center of Haverhill, replacing Haverhill Center. However, soon after the Civil War, many New Englanders migrated to the fertile soils in Ohio and beyond, abandoning the stony hill farms above the river valley.

With increasing technology, the dams and mills increased in size and capacity along the river, using it for power and as an available resource for disposing of domestic and industrial waste. In 1870, at the now abandoned Willowdale Village in Littleton (at the Lisbon/Littleton town line), a waterwheel was constructed that produced 92 horsepower and powered 2 lumber mills.

The beginning of the 20th Century again saw changes in economic and land use patterns. Trains came to depend on an ever increasing number of tourists from Boston and New York, who came

to spend summers in the large hotels throughout the White Mountains. Bethlehem alone had over 30 such hotels that could accommodate nearly 10,000 persons.

Factories thrived along the river and electric turbines were installed to produce electricity for the villages of Woodsville, Bath, Lisbon, and Littleton.

Factories along the river began a slow decline as electricity replaced water power, trucks replaced the need to be near a railroad line, competition from the south increased, and laws were passed at both the state and federal level to improve water quality.

Modernization included road improvements to accommodate the automobile and tractor trailers. Routes 302 and 3 brought traffic to and from the area from all directions, as the railroads began to lose popularity. In the 1980's and 90's the interstate highway system reached the North Country with I-93 passing through Littleton and I-91 in Vermont, running parallel to the Connecticut River.

Historic Sites and Resources

The tables below detail historic and archeological resources along the river and many are shown on Map 7. While no detailed inventory of historic or archeological sites has been done along the entire corridor, the following is based on a review of local histories, field observation, and a 1992 historic resource inventory done as part of an environmental assessment of a proposed Route 302 bypass which included 8.2 miles in Bath, Landaff, and Lisbon.

National Register of Historic Places

Town	Listed Site	Date Listed
Bath	Brick Store	1976
Bath	Goodall-Woods Law Office	1985
Bath	Jeremiah Hutchins Tavern	1980
Lisbon	Lisbon Inn	1980
Littleton	Lane House	1980
Littleton	Littleton Opera House	1980
Littleton	US Post Office	1980

Historic Bridges Over the River

Town	Bridge
Haverhill/Bath	Haverhill-Bath Covered Bridge
Bath	Bath Covered Bridge
Bath	Bath Rail Road Bridge
Bethlehem	Pierce Bridge
Bethlehem	Prospect Street Bridge
Carroll	Old Town Road truss

Historic Sites, Markers, & Memorials

Town	Structure/Area
Haverhill	Veteran Memorial VFW Woodsville
Haverhill	Haverhill/Bath Covered Bridge
Bath	Lone Elm Tea Room
Bath	Bath Village Covered Bridge
Bath	Mercy's Rock*
Bath	Bath Village War Memorial
Bath	Bath Upper Village
Bath	Simonds Brook Agricultural Area
Landaff	The Acre Residential Area
Lisbon	Young-Cobleigh Tavern
Lisbon	Lisbon Village Area
Lisbon	Original Village Marker
Lisbon	The Old Coal Kiln*
Littleton	Soldiers Memorial
Littleton	Willow Dale Settlement *

* NH Historic Marker

Archeological sites were also inventoried as part of the Route 302 study and six sites were identified as having prehistoric (Native American) and two historic (post 1700) sensitivity.

Archeological sites in Bath, Landaff, and Lisbon

Town	Site	Type
Bath	East bank of Ammonoosuc, confluence of Wild Ammonoosuc	Pre-Historic
Bath	East bank of Ammonoosuc north of Bath Village	Pre-Historic
Bath	East bank of the Ammonoosuc north of Upper Bath Village	Pre-Historic
Bath	East bank of Ammonoosuc near Cate's corner	Pre-Historic
Landaff	Confluence of Mill Brook	Pre-Historic
Lisbon	Floodplain at Cobleigh Meadows	Pre-Historic
Bath	Harriman Farm Area	Historic
Landaff	Mill Brook confluence	Historic

Source: NHDOT Lisbon By-pass report

The State of New Hampshire also maintains a State Register of Historic Places and files on archeological sites. A review of the files in Concord found no sites listed within the corridor. Of course, towns have identified other locally important cultural and historic structures and sites near the river, some of which are listed below.

Locally Identified Historic Sites

Town	Site
Haverhill	Woodsville Opera House
Bath	Bath Church
Bath	Town Building
Bath	Route 302 cemetery
Lisbon	Town Hall/Opera House
Lisbon	Village Dam
Lisbon	Parker Block
Lisbon	Railroad Station
Lisbon	Library
Littleton	Main Street Buildings
Littleton	Kilburn House
Littleton	Railroad Station
Littleton	Edson Berry House
Littleton	Meadow Street Cemetery
Carroll	St. Patrick's Church

Note: Sites previously mentioned not repeated.

The report "NH River Protection and Energy Development Project Report" (NE Rivers Center), assessed historic and cultural values in rivers in New Hampshire and found these resources in and along the Ammonoosuc River to be of "high significance".

(b) Community Resource

Briefly describe how the river is recognized or used as a significant community resource. If the river's importance is recognized in any official town documents, such as a master plan, include reference to such documents.

The river is recognized in all the towns as a significant resource and is becoming even more significant as its importance for recreation and tourism grows. Haverhill is very aware that Woodsville's water supply comes from the river. Both Lisbon and Littleton have Main Street programs that focus on the value of having the Ammonoosuc flowing right through downtown. Littleton, in fact, has constructed a new covered walking bridge across the river from its downtown, connected to a river trail loop that features the river. Carroll and Bethlehem, in the heart of the White Mountains, appreciate the rivers beauty as well as its economic importance as a recreational resource.

All towns have Master Plans and all of them have goals of maintaining their rivers and streams, wildlife and water quality for environmental, recreational, historic, economic or scenic purposes. For example:

The revised Bethlehem Master Plan (2004) is very proactive about the Ammonoosuc:

- "Goal #10: Protect the Ammonoosuc River corridor from development that degrades water quality and the aesthetics of this ecosystem; adopt a shoreland

protection ordinance and work with other towns and the Department of Environmental Services to protect the entire Ammonoosuc watershed."

- "With its watersheds draining to the Ammonoosuc and Gale Rivers, Bethlehem has a responsibility to others "downstream" not to pollute these significant sources of drinking water, recreation, and wildlife habitat. Proactively dealing with land use changes within the community, and notifying other communities of potential regional impacts under NH RSA 36:56 will benefit the community and the region."

- "Identify the entire corridor of the Ammonoosuc River from Carroll to Littleton as one of Bethlehem's most scenic and natural areas"

The Haverhill Master Plan (1999) has as goals:

- "Make stream & river resources a focal point in tourism efforts. This will require water quality to be maintained and improved. Environmentally sound stream and river corridor practices above and beyond state mandated levels must be implemented."

- "Improve fish & game stocking practices and create "fly fishing only" sections on the Oliverian, Ammonoosuc, and Wild Ammonoosuc Rivers."

- "(Acquire) North Yard railroad property (at junction of the Ammonoosuc and Connecticut Rivers) for a park, walking trail, and recreation facility."

The recently updated Littleton Master plan based on the town's 2003 Natural Resource Inventory (2003) states:

- "Water resource planning should be an integral part of all land use planning in Littleton.

- "Overall, rivers and lakes are an important natural resource in Littleton. The town should make every effort to protect its lands and rivers through support of organizations that strive to enhance and protect water quality;

- "...take a leadership role because there is much to lose from a loss in water quality, including an irreplaceable water supply and recreation based economy;

- "...adopt shoreland protection regulations at the local level."

- "The Conservation Commission should work to obtain easements for buffers on the Ammonoosuc and Connecticut Rivers."

4. Recreational Resources

The Ammonoosuc River corridor is well suited for recreation. Encircled by the natural beauty of the area, residents and tourists enjoy swimming, fishing, camping, hiking, hunting, photographing, picnicking, and canoeing. The table below and Map 7 show many of the recreation sites on the river by town and location.

(a) Fishery

Identify the type and location of any high quality recreational fisheries or areas with such potential which are present in the river (as determined by the NH Fish and Game Department). Also indicate areas that have potential to be significant fisheries.

The Ammonoosuc is an excellent fresh water fishery which offers anglers good access and long stretches of fishing opportunity. Stocking by the NH Fish & Game enhances the opportunities and helps meet the high fishing pressure. The river is stocked along its entire length.

According to a Trout Unlimited fisherman, long reaches of the river are exceptional, particularly the sections in Twin and along River Road in Bethlehem and the area from Salmon Hole south to Woodsville. The only exception, according to NH Fish & Game Region 1, is the section of wide, ledge outcroppings that extend through down town Littleton. This section of the river becomes a bit too warm in the summer months to support cold water species.

(b) Boating

Describe any significant recreational boating opportunities which are present on the river, including whether it is used for motorized boating. Indicate if the river is cited as significant for recreational boating in a publication of a national, regional or statewide recreation organization. Refer to the NH River Protection and Energy Development Project to determine the river's significance as a recreational boating river. Also note if boaters are attracted from beyond the local area and if there are areas with potential to be significant boating resources.

While little to no boating is undertaken in the Ammonoosuc, canoeing and kayaking are becoming increasingly popular and the river offers a wide variety of opportunities and skill levels. The AMC Guide to Canoeing and Kayaking rates the upper portions of the river as having Class II to IV white water canoeing while the lower portion is classed as flat water. One river guide describes the river as follows:

> "The Ammonoosuc River is a great run. A smaller river with steeper gradient, the section of the Ammonoosuc we run sports a turny, gravely, rock strewn character with steady current and several small sections of class I/II rifts. The scenery is fantastic. There are open fields with classic New England farms, rock cliffs, and two historical covered bridges. One of these bridges is the nation 's oldest and the other is the longest. If fishing

is your thing you will enjoy this trip. Brook, brown, and rainbow trout are the main species encountered." (Hemlock Pete's, Canoe Rentals, No Haverhill, NH).

The NH Atlas & Gazetteer describes the river as a "...wilderness river offering thrilling whitewater and Class III rapids; best at high water." Canoe and kayak rental businesses in the area report that they rent to individuals from all over the country.

The report, "NH River Protection and Energy Development Project", identifies the Ammonoosuc as being of the "highest significance" in the state for white water boating (canoeing and kayaking).

The White Mountain School in Bethlehem, an outdoor oriented private secondary school regularly takes students on kayaking and canoeing trips on the river as part of its outdoor curriculum. One of the instructors said of the river, "the Ammonoosuc River is great white water and is very doable for all kayaking and canoeing abilities."

(c) Other Recreational Opportunities

List any other recreational areas, facilities, or opportunities or potential for such on the river or in the river corridor (e.g., hiking, camping, picnicking, etc.). Indicate ownership, if known.

The table below offers a list of the many and varied recreational opportunities along the river, both public and private.

Recreation Sites along the Ammonoosuc River

Type	Town	Name/ Ownership	Town/Location	Size (acres)	River Frontage
R.R. Trail	H,B,L, L, L	State R.R. ROW	Alongside 302	-	Yes
Snowmobile trails (several)	H,B,L,L,L,B, C	State, federal, clubs	Throughout	-	Yes
Town Park	Haverhill	Woodsville Park	Main St	0.5	No
Campground	Bath	Twin River	Junction 302/112	10.0	No
School Playground	Bath	Bath Village School	Route 302	1.0	No
Picnic Area	Bath	Bath Covered Bridge	West end	0.2	Yes
Recreation Fields/Pool	Lisbon	Lisbon Lions Club Field	Bath Road	4.0	Yes
Town Park	Lisbon	Lisbon Park		0.5	
Type	**Town**	**Name/ Ownership**	**Town/Location**	**Size (acres)**	**River Frontage**
Tennis/Basketball Courts	Lisbon	Lisbon Lions Courts	Main St.	.25	Yes
Tennis/Basketball & Indoor amenities	Lisbon	4 Seasons	Route 302	20	Yes
Soccer Field	Lisbon	Lisbon Wire Mill Field	Main St.	2.0	Yes

Campground	Lisbon	Mink Brook	Route 302	5.0	No
Golf Course	Lisbon	Ammonoosuc Country Club	Route 302	130.0	Yes
Campground, swimming	Lisbon	KOA	Route 302	10.0	Yes
Horse Track	Littleton	Hadlock (private)	Route 302	5.0	Yes
Picnicking/hiking/fishing	Littleton	Dells Park	Dells Road		No
Recreation Field	Littleton	Norton Field		2.4	Yes
Recreation Field & tennis court	Littleton	Apthrop Common	RR Street	3.0	No
Recreation Field	Littleton	Lakeway School	Bishop St	1.0	No
Trails, swimming	Bethlehem	Wayside Inn	Route 302	10	Yes
Campground, swimming	Carroll	Tarry-Ho Campground	Route 302	2	Yes
Hiking	Carroll	Carroll Rec. Trail	Route 302	4.5	?
Campground, swimming, fishing	Carroll	Beech Hill	Route 302	15.0	Yes
Campground, swimming	Carroll	Living Water Campground	Route 302	10.0	Yes
Campground, picnicking, swimming	Carroll	Zealand-WMNF	Route 302	100	Yes
Recreational Parking, Trails	Carroll	Zealand-WMNF/DOT	Route 302	-	No
Trails	Carroll	Zealand Brook	-	miles	Yes
Camping, fishing, hiking	Carroll	Sugarloaf I & II WMNF	Route 302	Entire forest	Yes

Source: NH Department of Resources and Economic Development and NH Atlas & Gazetteer, DeLorme

(d) Public Access

List any existing public access sites located along the river. These may be formal or non-formal access points. Include the type of public access (e.g., canoe only), related facilities (e.g., parking), and if known, ownership at each site.

Public access for fishing, kayaking, canoeing, and swimming can be found almost anyplace along the River where there isn't a private residence. NHDOT's Route 302 right of way extends to the river's edge along many portions of the river. There are several informal pull offs along the river which make it easily accessible to the public for recreation. Following are a few of the well-known, favorite access points along the River:

Ammonoosuc River Public Access	
Woodsville	Below dam / confluence of Connecticut River
Woodsville/Bath	River Road / several pull offs
Bath	Along Rt 302, old railroad bed trail
Bath	Covered bridge next the dam
Bath	Pull off by the RR bridge off Rt 302

Lisbon	Above and below dam
Lisbon	ATV parking lot in town
Lisbon	Salmon Hole, Rt 302 & Lyman Road
Lisbon	Across from Varney & Smith Lumber on Route 302
Lisbon	DOT pull off along Rt 302, fire truck access
Littleton	Walking Bridge parking lot
Littleton	Below Apthrop Dam
Littleton	WalMart parking lot
Bethlehem	Old Rt 16
Bethlehem	DOT parking area along 302
Bethlehem	Big Pine Tree along Wing Road
Bethlehem	Pierce Bridge off Rt 302
Carroll	Zealand Campground (WMNF) off Rt 302
Carroll	DOT parking area off Rt 302
Carroll	Lower Falls off Rt 302

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There are also several private campgrounds along the river that provide access to registered campers See the Recreational Sites table above.

5. Other Resources

(a) Scenic Resources

Briefly describe any significant scenic focal points along the river including designated viewing areas and scenic vistas and overlooks. Indicate the location of the significant views to and from the river.

The entire river offers spectacular and varied scenic and cultural vistas. These have been recognized by state and federal designations. Route 302 from Woodsville north to the junction of Route 117 and Route 302 from Littleton to Twin Mountain have been designated as a state Scenic & Cultural By-Way. Route 302 from Twin Mountain east to the upper limit of the corridor and beyond has been designated a federal Scenic Byway.

Some views are spectacular natural views, such as views of the Presidential Range and Mount Lafayette in the White Mountain National Forest. Others involve a mix of natural and manmade features such as viewing fall foliage along the river as one drives a curving section of Route 302. A few specific viewing locations include:

- Viewing the ledges at the river's confluence with the Connecticut from the old Bath-Woodsville covered bridge.

- Viewing the river and the Bath "gorge" from the trail on the old rail road bed.

- Viewing the combination of the Bath covered bridge, falls, impoundment, Bath Store, and church from both sides of the river.

- Views of Historic Upper Bath Village while driving along Route 302.
- Views of the Lisbon Dam and "Island" from the School Street Bridge and town park.
- Views of the Presidential Range from Route 302 & I-93 in Littleton.
- Views of the rapids and historic structures from the Littleton Senior Center on the south side of the river.
- Views of the White Mountains, including Mt. Washington, from many locations along Route 302 north of Bethlehem Village.
- Views of the river and the White Mountains from the Visitors Center in Carroll.
- Views of Lower Falls from the walking path adjacent to them.

(b) Land Use

Briefly describe the general patterns of current land use in the river corridor. Include location of significant developments within the river corridor including agricultural, residential, commercial, and industrial developments, and solid waste management facilities. Also include location of lands used for forest management or which are undeveloped. Identify such features as roads along the river, railroads, bridges, and utility crossings. Describe the type and location of any proposals for major developments within the river corridor.

Land use in the river corridor is a complex mix of forestland, agricultural land, wetlands and built-up or disturbed areas. The following table summarizes the land use cover types for the corridor, based on digitized satellite imagery compiled the Complex Systems Research Center at UNH and the GRANIT program. Twenty-one land cover classes were combined into six categories in the table and further combined on Map 5.

The corridor is primarily forested which includes a variety of forest cover types from softwoods (spruce/fir) to hardwoods (birch/aspen). The category also includes areas that were clear-cut at the time of compilation. The upstream towns, Bethlehem and Carroll, have the most forested acreage while most remaining agricultural land is found on the lower river.

Much of the wetland acreage was included in the forestland cover type because most of it is forested wetland.

Urban/buildup areas occupy over 13 percent of the corridor and that percentage is rising. It includes roads, railroads, commercial, industrial, municipal, and residential land uses. The

villages of Littleton, Lisbon, and portions of Woodsville have the most concentrated built-up areas while highway and highway commercial/industrial uses account for most of the remainder.

Agricultural use is less than 10 percent and falling quite rapidly as agricultural lands are converted to other uses or are idle due to the loss of many active farms within the corridor. Most of the agricultural cropland lies directly along the river in the floodplain while hayland and pastureland can be found at higher elevations.

The Ammonoosuc River Valley is currently in the middle of a development boom with increases in commercial and residential users and a population growth exceeding projections. The presence of Interstate 93 and Route 302, which parallels the river for most of its length, makes the area a desirable location for large and small-scale commercial development. The rate of this development has been increasing, particularly around Exit 42 in Littleton, which has seen box stores such as Wal-Mart and Home Depot, with several others currently in the planning stages. There is growing concern about the impact of development on the river corridor. The change in land use from farmland to commercial, industrial and other high intensity uses has many people concerned, including local officials in towns downstream, such as Lisbon, Bath, and Woodsville. The possibility of increased turbidity, higher water temperatures, increased bacteria levels, increased stream bank erosion and more frequent flooding are all concerns that have been raised. Recreational users are also concerned about a decrease in the quality of their river experiences. A recent study by the North Country Council (Ammonoosuc Valley Mitigation Banking Feasibility Study, 2001) found that most of the land within 250-feet of the Ammonoosuc, even though often within the 100 year floodplain, was zoned for commercial/industrial growth or un-zoned and concluded that this could have a significant impact on the ecology of the valley.

Land Use by Coverage in the Corridor (acres)

Town	Forest	Farmland	Urban/Builtup	Disturbed	Wetland	Water
Haverhill	66	27	38	0	3	11
Bath	1883	603	214	21	102	329
Landaff	124	13	36	0	8	23
Lisbon	1801	378	439	32	88	218
Littleton	960	171	701	33	97	119
Bethlehem	3131	83	271	17	230	217
Carroll	2495	39	315	23	122	93
TOTAL	**10461**	**1314**	**2014**	**126**	**650**	**1010**
Percent of Corridor	**67**	**8**	**14**	**1**	**4**	**6**

Source: GRANIT

(c) Land Use Controls

Identify the municipalities with existing master plans and zoning ordinances within the river corridor. Identify existing or significant proposed land use controls which affect the river and the river corridor (e.g., zoning, easements, and subdivision regulations).

Land use and land use density is primarily regulated at the local level by municipal ordinances and regulations discussed below. Since they often govern the patterns of development in a river corridor, they can have a tremendous impact. The following table summarizes the land use regulations for the towns along the river and includes a breakdown of some of the regulatory components that impact the corridor.

Local land use regulations in New Hampshire are of three types: Zoning Ordinances, Subdivision Regulations, and Site Plan Review Regulations, as discussed below.

Existing Land Use Regulation Summary
Towns with the Corridor

	Haverhill	**Bath**	**Landaff**	**Lisbon**	**Littleton**	**Bethlehem**	**Carroll**
Master Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zoning	No	Yes	Yes	Yes	Yes	Yes	Yes
Sub Reg.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Site Plan Reg.	No	Yes	Yes	Yes	No	Yes	Yes
Residential Uses	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Commercial Uses	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial Uses	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Min. Lot Sizes w/S&W (ac)	No	1-2	2	0.5-2	None	2	1
Min.Lot Sizes wo/S& W (ac)	Soil Based	1-2	2	2	1-3	2	1
Min. Bldg. Setback from river							
Flood Hazard Area Ord.	Yes	Yes	No	Yes	Yes	Yes	Yes
Flood Hazard Area Protection	No	Yes	No	No	No	No	No
Wetland Ord.	Yes	Yes	No	No	No	No	No
Aquifer Ord.	Yes	Yes	No	No	No	No	No
Shoreland Prot. Ord.	No	No	No	No	No	No	No
Veg. Buffer	No	No	No	No	Partial	No	No
Steep Slope Ord.	No	Yes-6ac min	No	No	No	No	No
Excavation Ord.	Yes	No	Yes	No	Yes	Yes	Yes
Agricultural Land Prot.	No	Yes	No	No	No	No	No
Cluster Permitted	No	Partial	Yes	Partial	Partial	Partial	Partial
Limits on Impermeable Surfaces	No	No	No	No	No	67% max.	No
Stormwater Regulations	No	No	No	Yes	No	No	Partial
Erosion & Sediment Reg.	No	Partial	No	No	Yes	Partial	Partial

A simple buildout analysis developed for the Corridor Committee showed the corridor currently consisting of approximately 3500 lots for an average lot size of 6.7 acres. Based on existing regulations, the number of lots in the corridor could double in the future if every non-protected area was subdivided.

(d) Water Quantity

List the location of all operating stream gauge stations maintained by the U.S. Geological Survey, U.S. Army Corps of Engineers or the Department of Environmental Services. Include the number of years of record and whether it is a partial or full record station.

Stream flow varies dramatically on the Ammonoosuc due to climate and precipitation patterns. Currently, the USGS maintains stream flow gauging stations on the Ammonoosuc River only at one location which is in Bethlehem, north of the Bethlehem Dam. Another station was operated in Bath between 1936 and 1970. One station also exists on the Connecticut River just downstream of the confluence with the Ammonoosuc. The following table is a summary of the flow data for each station.

River Flow Data

Source: USGS

(cfs)

	Connecticut River	**Ammonoosuc River**	**Ammonoosuc River**
Location	Woodsville	Bath	Bethlehem
Years of Data	1939-2002	1936-1970	1939-2002
Drainage Area (sq. miles)	2,644	395	88
Annual Mean	5,017	639	207
Highest Annual Mean	7,355	1,004	323
Lowest Annual Mean	3,211	413	131
Minimum Daily Dis.	152	-	16
Highest Daily Mean	50,600	-	6,300
Maximum Peak Flow	57,100	27,900	11,300

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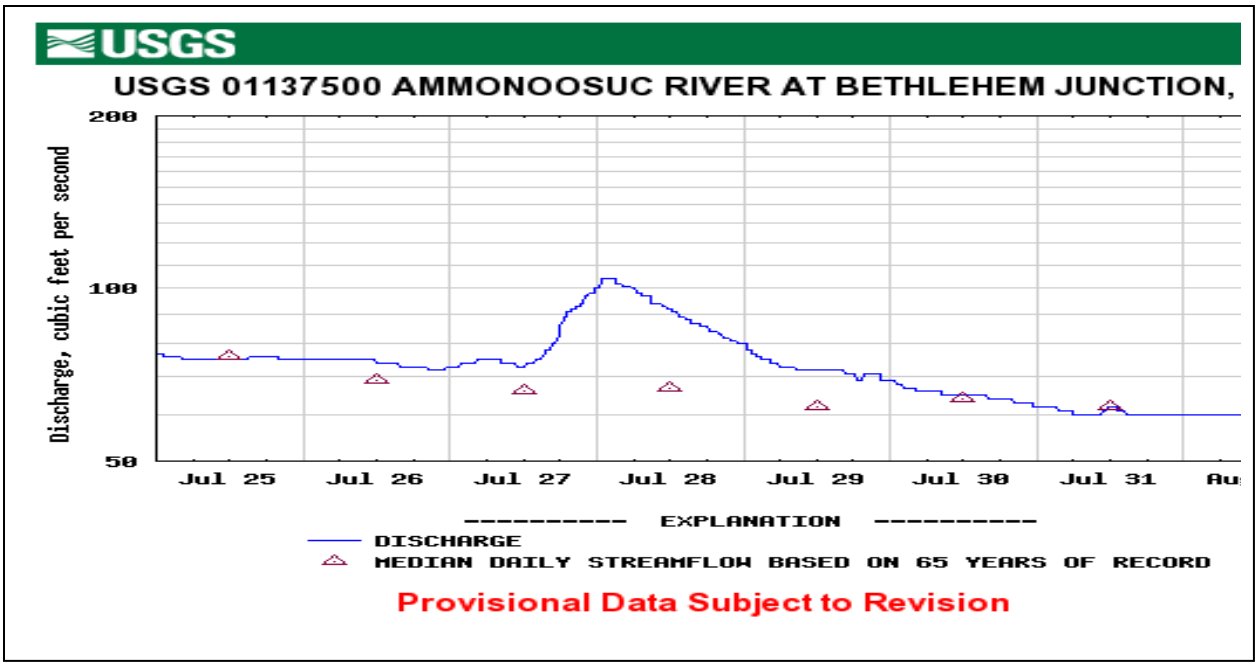


(e) <u>Riparian Interests/Flowage Rights</u>

Briefly describe any riparian interests in the corridor, including any known flowage rights, historic water uses, and legislative authorizations or appropriations (for example, a town given legislative authorization to water for public consumption in the 19th century).

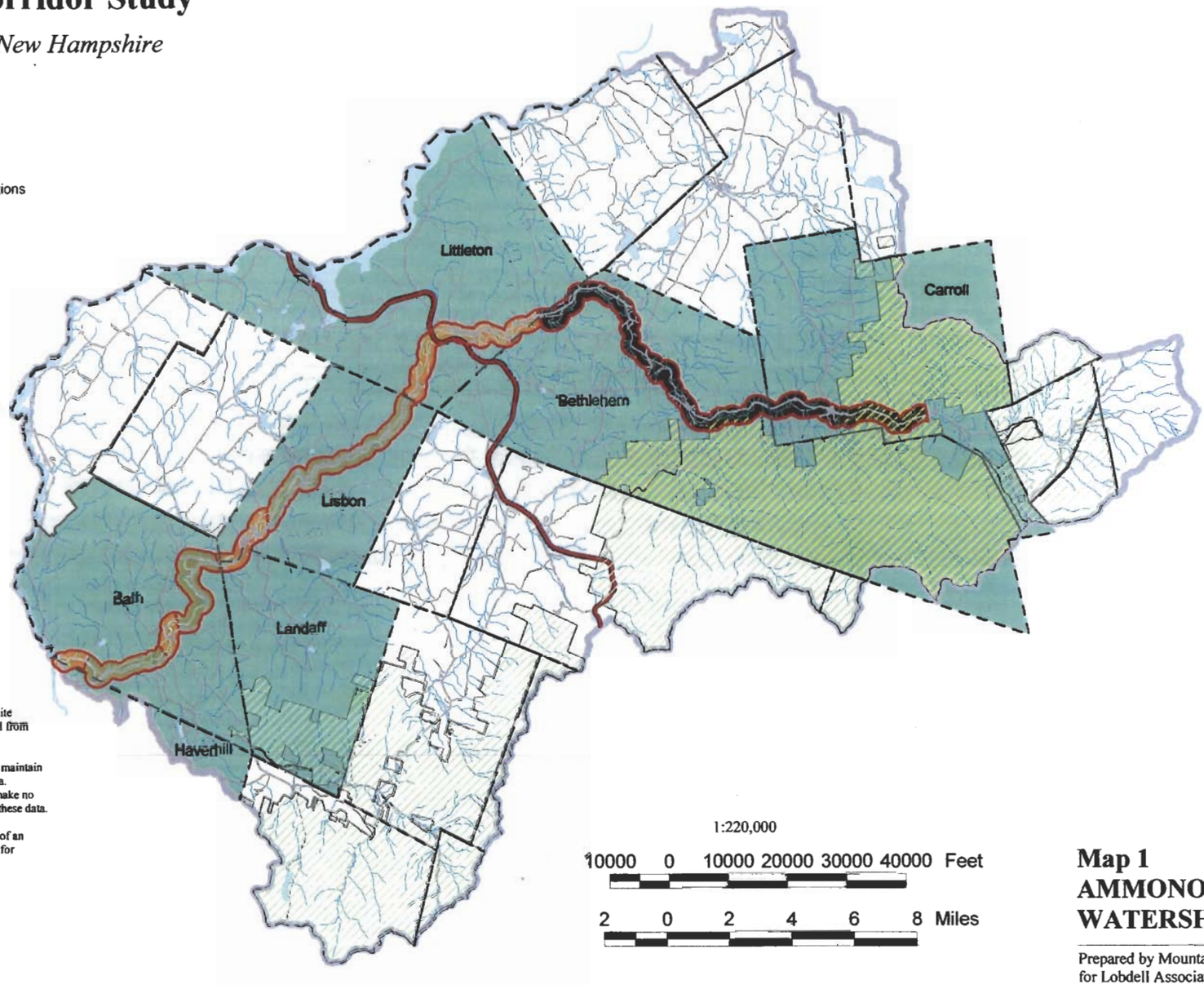
There are no known significant riparian interests or flowage rights along the Ammonoosuc.

<u>Final note:</u> Before submitting the nomination, please check the form for completeness. Nomination forms are reviewed for completeness by the Department of Environmental Services. Be sure to consult Env-C 700 and RSA 483 to make sure that all information requirements have been met. Incomplete nominations will be ineligible for consideration by the State Legislature in the next legislative session.

MAPS

Ammonoosuc River Corridor Study

New Hampshire



N

Ammonoosuc River Corridor Proposed Designations

- Community
- Rural
- Rural/Community
- Municipal Boundaries

Roads

- Interstate
- Secondary Highway
- Local
- Not Maintained
- Private Roads
- Surface Water
- White Mountain National Forest
- Corridor Communities
- Ammonoosuc Watershed

Sources

Ammonoosuc Watershed delineation, political boundaries, White Mountain National Forest lands, and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

This map is one of a series of maps that were produced as part of an Ammonoosuc River Corridor Study and is intended to be used for planning purposes only.

Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)

PeopleGIS created many of the feature layers used for the map from the sources cited.

1:220,000

10000 0 10000 20000 30000 40000 Feet

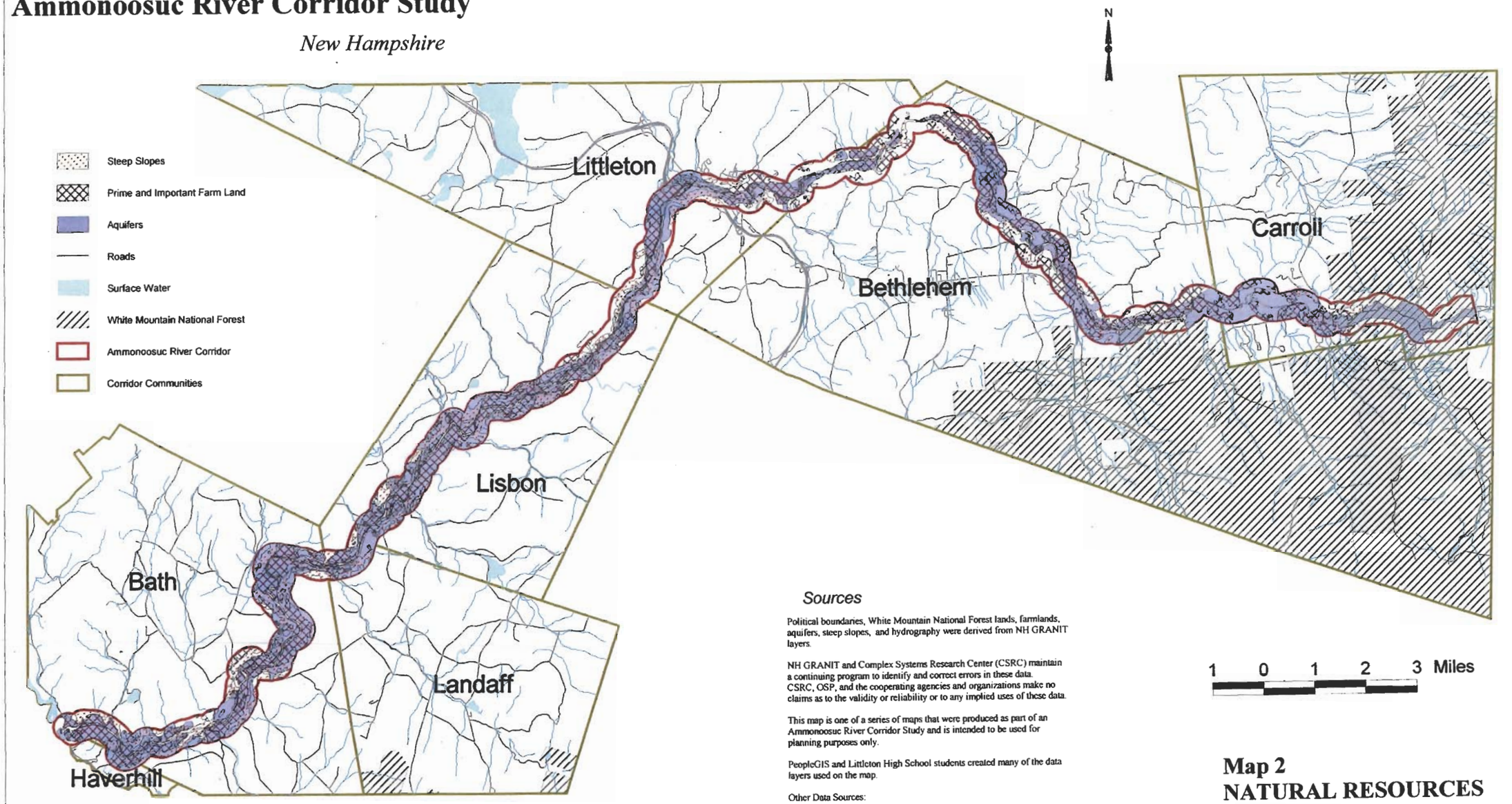
2 0 2 4 6 8 Miles

Map 1
AMMONOOSUC RIVER WATERSHED

Prepared by Mountain River Geographics
for Lobdell Associates, Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, White Mountain National Forest lands, farmlands, aquifers, steep slopes, and hydrography were derived from NH GRANIT layers.

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PeopleGIS and Littleton High School students created many of the data layers used on the map.

Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)

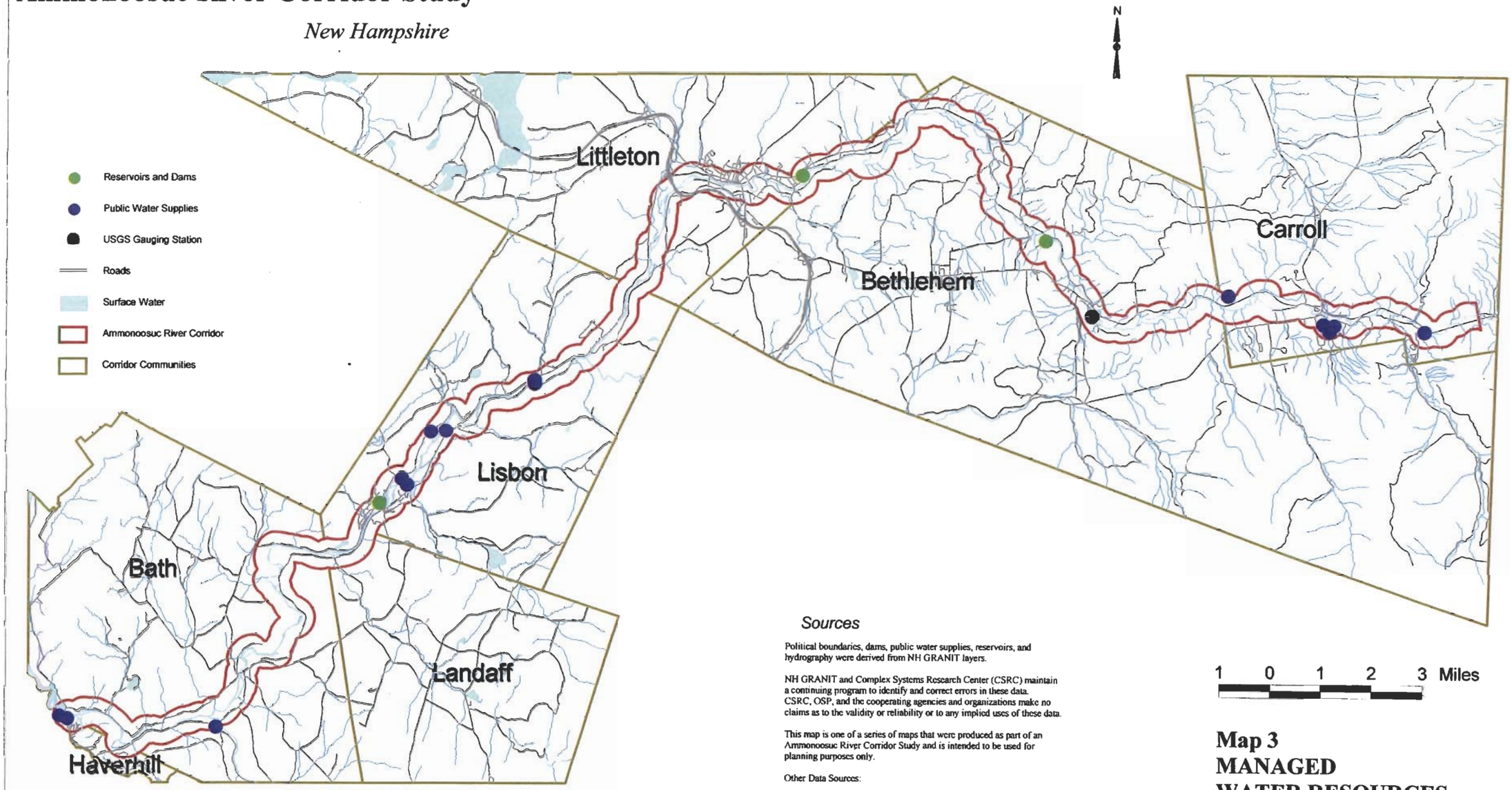
PeopleGIS created many of the feature layers for the map from the sources cited.

Map 2
NATURAL RESOURCES

Prepared by Mountain River Geographics
for Lobdell Associates Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, dams, public water supplies, reservoirs, and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

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Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)
- USGS Gauging Station derived from USGS data.

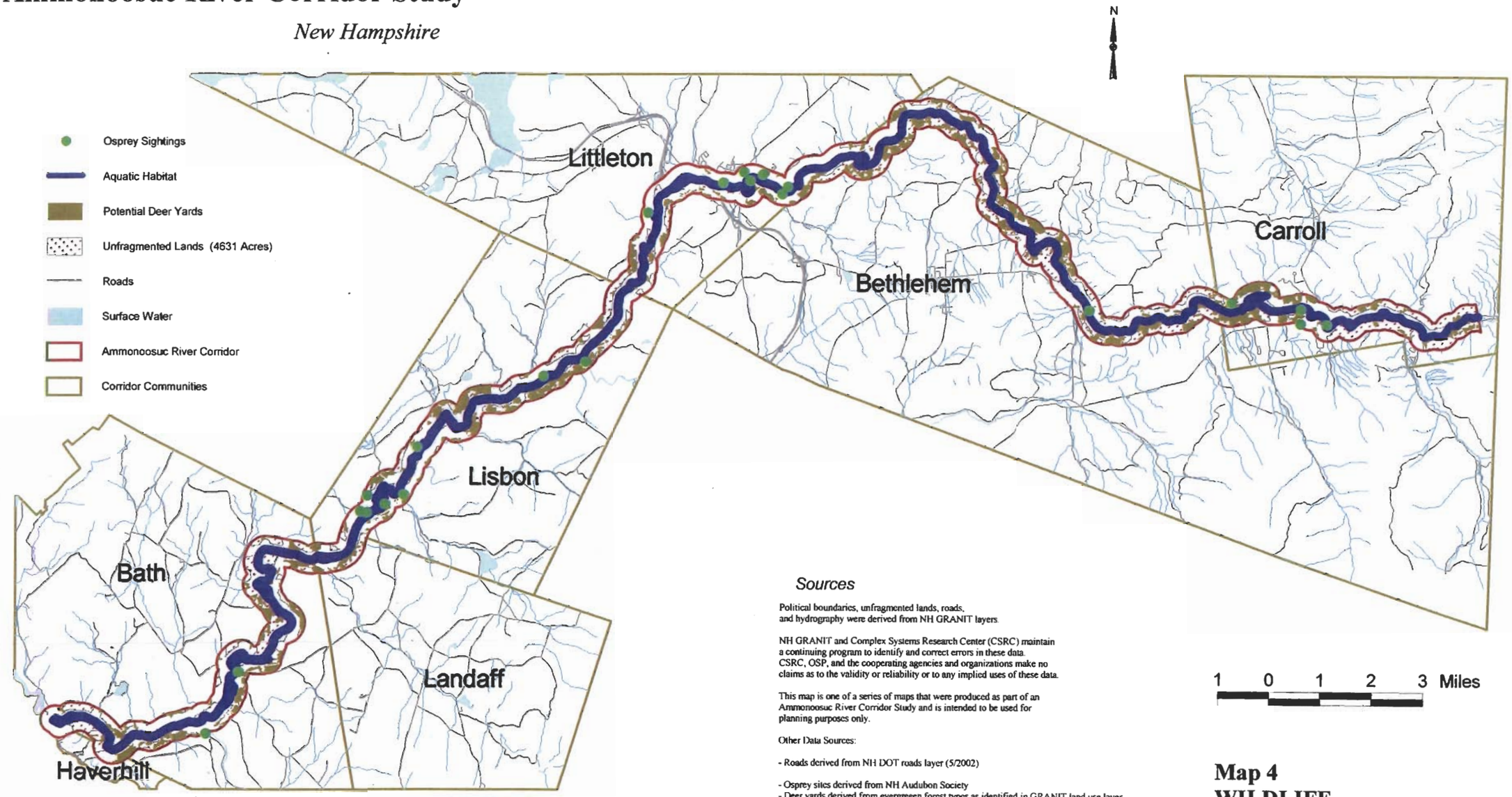
PeopleGIS created many of the feature layers for the map from the sources cited.

Map 3
MANAGED WATER RESOURCES

Prepared by Mountain River Geographics
for Lobdell Associates, Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, unfragmented lands, roads, and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

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Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)
- Osprey sites derived from NH Audubon Society
- Deer yards derived from evergreeen forest types as identified in GRANIT land use layer.

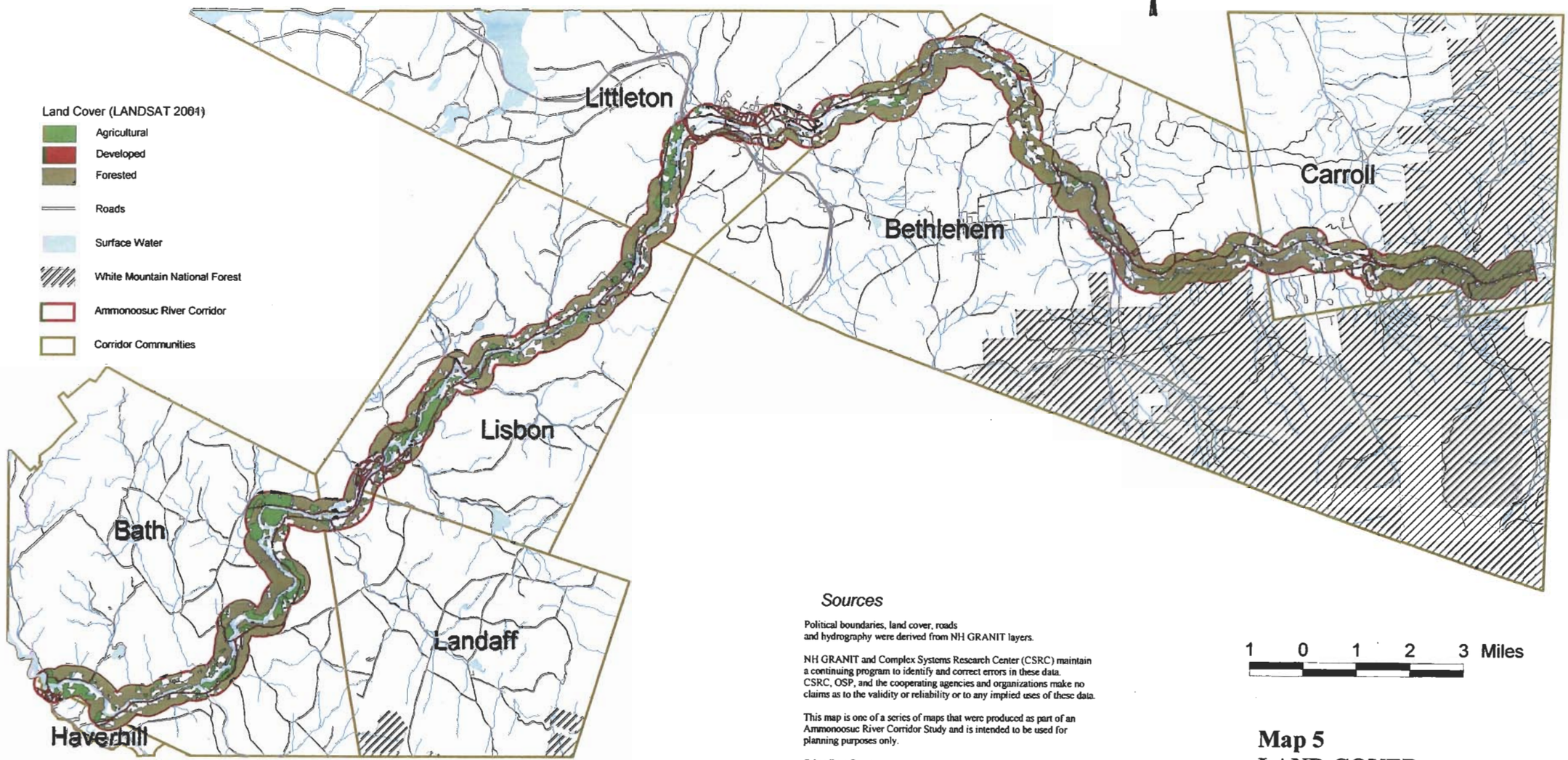
PeopleGIS created many of the featurelayers used for the map from the sources cited.

Map 4
WILDLIFE

Prepared by Mountain River Geographics
for Lobdell Associates Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, land cover, roads and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

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Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)

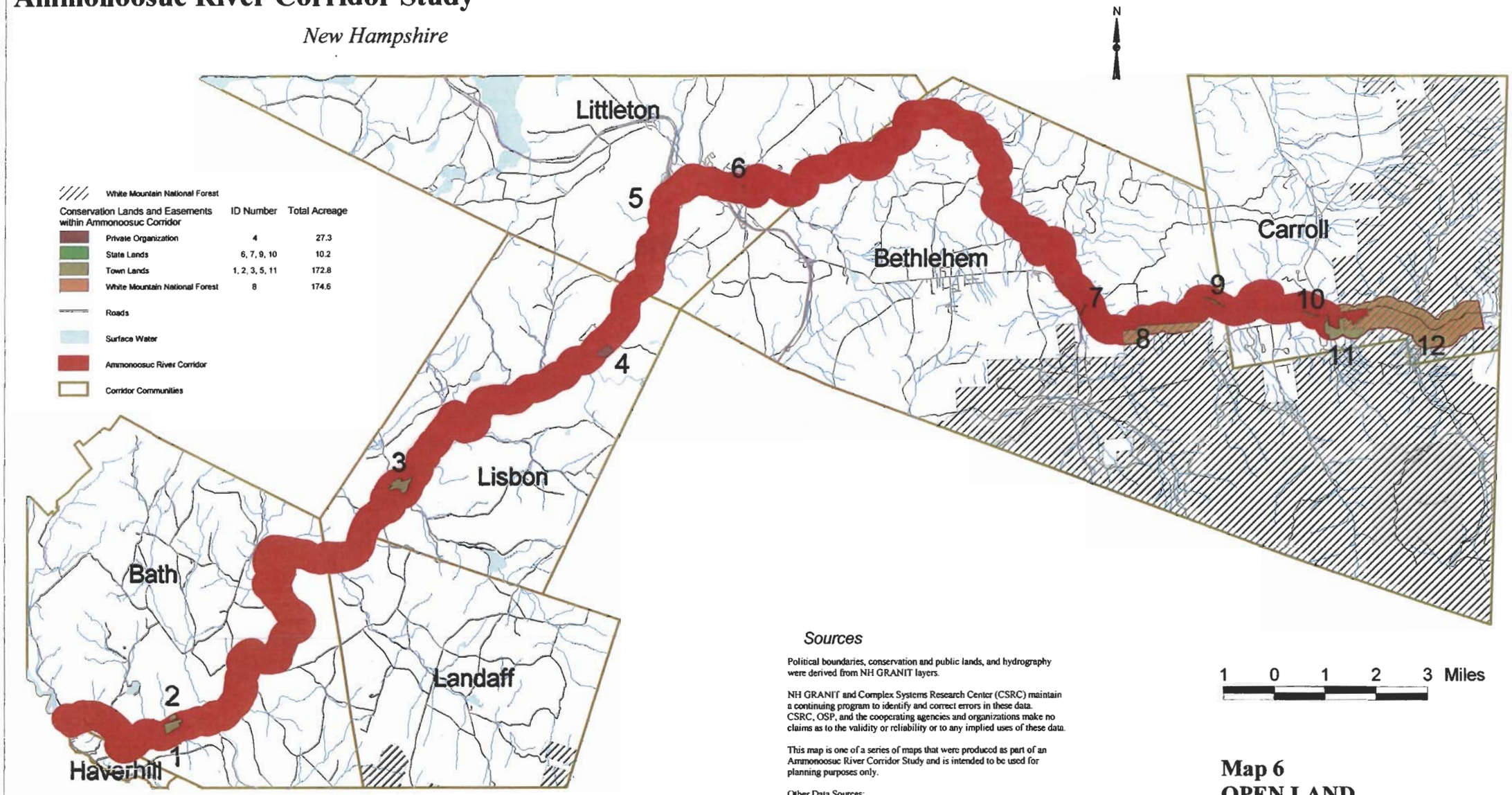
PeopleGIS created may of the feature layers for the map from the sources cited.

Map 5
LAND COVER

Prepared by Mountain River Geographics
for Lobdell Associates Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, conservation and public lands, and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

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Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)

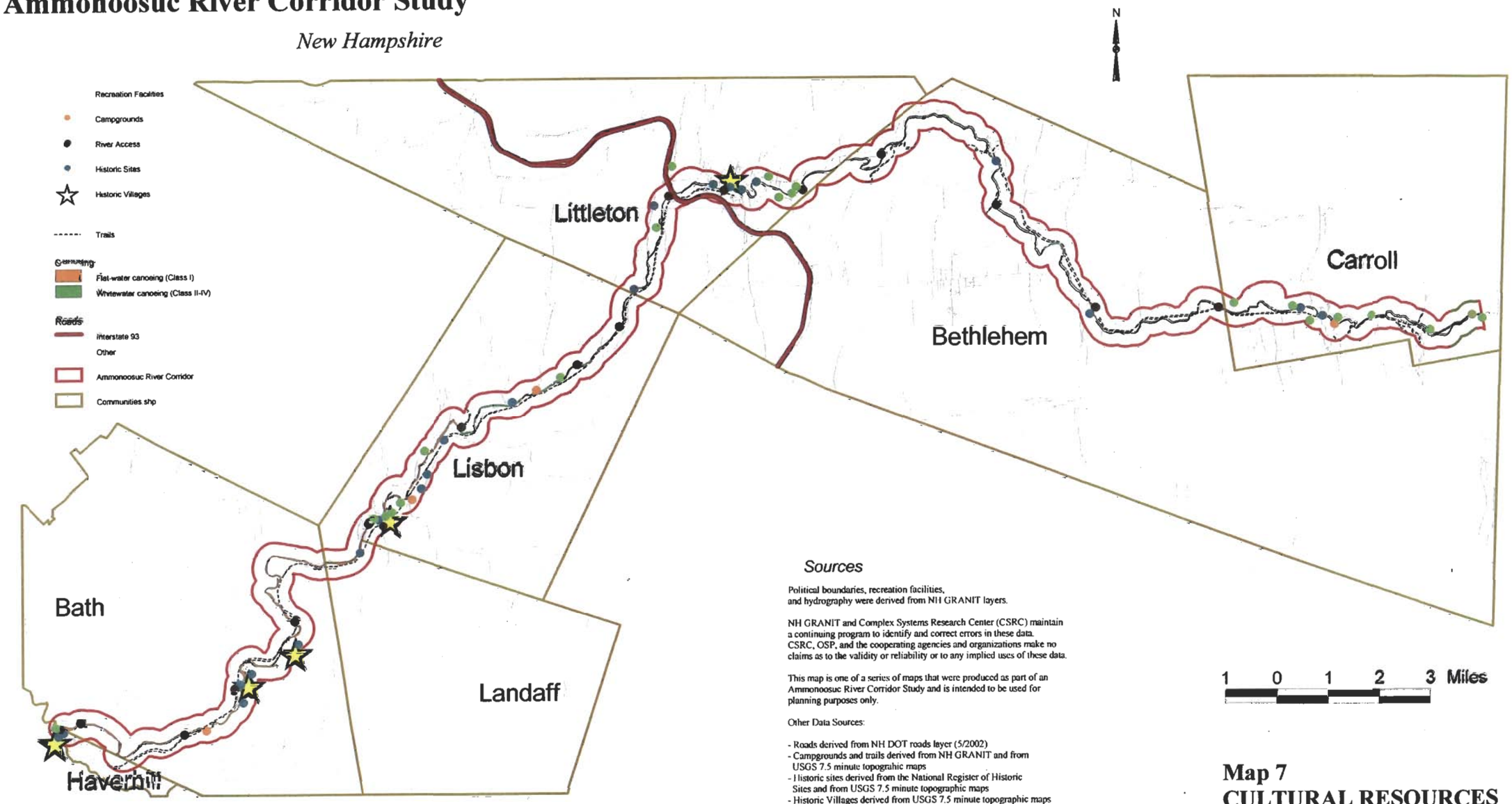
PeopleGIS created many of the feature layers for the map from the sources cited.

Map 6
OPEN LAND

Prepared by Mountain River Geographics
for Lobdell Associates Inc- November, 2005

Ammonoosuc River Corridor Study

New Hampshire



Sources

Political boundaries, recreation facilities, and hydrography were derived from NH GRANIT layers.

NH GRANIT and Complex Systems Research Center (CSRC) maintain a continuing program to identify and correct errors in these data. CSRC, OSP, and the cooperating agencies and organizations make no claims as to the validity or reliability or to any implied uses of these data.

This map is one of a series of maps that were produced as part of an Ammonoosuc River Corridor Study and is intended to be used for planning purposes only.

Other Data Sources:

- Roads derived from NH DOT roads layer (5/2002)
- Campgrounds and trails derived from NH GRANIT and from USGS 7.5 minute topographic maps
- Historic sites derived from the National Register of Historic Sites and from USGS 7.5 minute topographic maps
- Historic Villages derived from USGS 7.5 minute topographic maps
- River access digitized from USGS 7.5 minute topographic maps

PeopleGIS created many of the feature layers used for the map from the sources cited.

Map 7
CULTURAL RESOURCES

Prepared by Mountain River Geographics
for Lobdell Associates Inc- November, 2005